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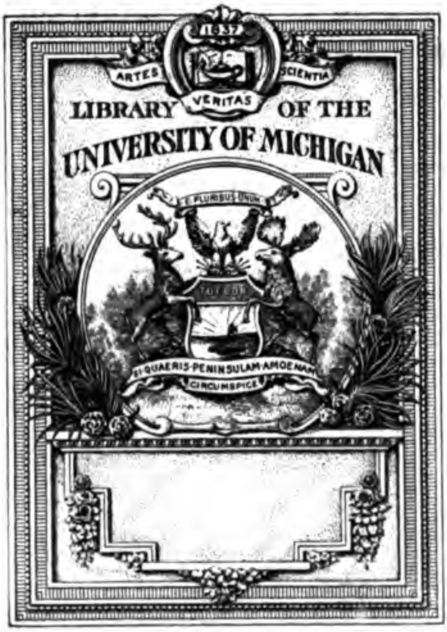

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ANNUAL REPORT

42845

OF THE

SECRETARY OF THE NAVY

FOR

THE YEAR 1890.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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870	Dec. 10, 1889
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4,400	Jan. 7, 1890
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970	June 7, 1890
4,300	July 28, 1890
4,083	Nov. 15, 1890

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	Tons.
....	4,083
....	1,700
....	1,700
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	Tons.
....	6,060
.....	3,815
....	3,815
....	3,815

....	6,648

REPORT

OF

THE SECRETARY OF THE NAVY.

NAVY DEPARTMENT,
November 26, 1890.

To the President:

Since March 4, 1889, nine new vessels, which were at that time in various stages of progress, the first two being practically out of the constructor's hands, have been completed and put in commission, as follows:

Name.	Tonnage.	Commissioned.
	Tons.	
Chicago	4,500	Apr. 17, 1889
Yorktown	1,700	Apr. 23, 1889
Petrel	870	Dec. 10, 1889
Charleston	3,730	Dec. 26, 1889
Baltimore	4,400	Jan. 7, 1890
Cushing	99	Apr. 22, 1890
Vesuvius	970	June 7, 1890
Philadelphia	4,300	July 28, 1890
San Francisco	4,083	Nov. 15, 1890

During the coming winter four more will be added to the list, namely:

	Tons.
Newark	4,083
Concord	1,700
Bennington	1,700
Miantonomoh	3,815

Of the other vessels which had been authorized prior to the above-mentioned date, four were at that time more or less advanced:

	Tons.
Puritan	6,060
Amphitrite	3,815
Monadnock	3,815
Terror	3,815

One had been fairly begun:

Maine	6,648

The designs of seven were nearly completed, but their actual construction had not yet been undertaken.

	Tons.
Authorized August 3, 1886:	
Texas	6,314
Authorized March 3, 1887:	
Monterey	4,000
Authorized September 7, 1888:	
Cincinnati (No. 7)	3,000
Raleigh (No. 8.)	3,000
Cruisers 9, 10, and 11	2,000

Six had not yet been designed:

Authorized September 7, 1888:	
New York (armored cruiser 2)	8,150
Cruiser 6	5,500
Practice vessel	835
Authorized March 2, 1889:	
Harbor defense ram	2,050
Gun-boats 5 and 6	1,000

Of the fourteen vessels last mentioned all are now well advanced in construction, with the exception of the ram, upon which proposals were invited October 18, 1890. There remain two other vessels, the dynamite gun-boat No. 2, whose construction was authorized conditionally, in case the *Vesuvius* proved a success, which fact has not yet been demonstrated; and the armored cruising monitor, also an experimental design, whose features hardly seem to meet the present demands of naval construction.

It thus appears that during the twenty months covered by the present administration nine new ships have been put in commission; four, including one monitor, have been advanced to a point where they are just about to go into commission; five are in such a condition that they will shortly be waiting only for their armor; seven have been built from the keel up, of which the *Texas* and *Monterey* are nearly ready for launching, and the five cruisers are well advanced; while of the six others previously authorized all have been designed and advertised, and all but one, the ram, have been contracted for and are actually under construction.

The first five vessels on the list—the *Chicago*, *Yorktown*, *Petrel*, *Charleston*, and *Baltimore*—were sufficiently described in the annual report of last year. Since that date all have been actively cruising, and all have justified, under the severe test of actual practice, the high expectations which were then formed of their efficiency as sea-going men-of-war.

Of the last four vessels placed in commission, the torpedo-boat *Cushing*, built by the Herreshoff Manufacturing Company of Bristol, R. I., is the first, and as yet the only craft of this description in the Navy, although a second has been authorized. She is built of steel, and has developed a speed of 23 knots. Her armament will consist of 3 torpedo-tubes and four 1-pounder guns. She not only compares favorably with foreign torpedo-boats, but stands very near the head of her class. If this country had twenty others like her, and had them equipped with effective torpedoes, they would be a material addition to its means of defense. As long as it has but two, they will be of little service otherwise than to show what native skill and ingenuity can do in this direction. Their effectiveness as compared with their small cost should induce a marked increase in their number.

To illustrate the extensive use of these boats the following table is subjoined, being a revision brought to date, of a similar table presented last year.

Torpedo boats built, building, or projected, 1889 *and* 1890.

Nation.	Number of boats.		Increase during past year.
	1889.	1890.	
France	191	210	19
England	207	206	(*)
Germany	98	180	82
Italy	128	152	24
Russia	138	143	5
Austria	60	61	1
Greece	51	51	....
Holland	16	50	34
Denmark	22	34	12
China	26	32	6
Norway and Sweden	19	31	12
Turkey	29	30	1
Japan	21	24	3
Spain	15	15	....
Brazil	15	15	....

* One boat lost.

The *Vesuvius*, built by William Cramp & Sons, was given her final trial May 10, 1890, to ascertain her indicated horse-power. This was determined to be 3,794, being 594 in excess of the contract requirement. The estimated speed developed during the eighteen minutes of the trial was 21.42 knots an hour. The vessel is still an experiment, the trial of her dynamite guns and the tactical test of the ship having been delayed by the want of projectiles, which the company has thus far been unable to supply.

The *Philadelphia*, also built by William Cramp & Sons, underwent her contract trial June 25, 1890, and developed 8,814 horse-power and a speed of 19.68 knots. This vessel is a sister ship of the *Baltimore*, and it is believed will, upon developing the full capacity of her boilers, and under more favorable conditions, surpass not only her own high record, but possibly also that of her consort, the hulls of the two ships being nearly identical, while the *Philadelphia* has a greater heating-surface on her boilers, and, in some respects, improved engines.

The trial of the *San Francisco*, built by the Union Iron Works, took place August 27, 1890. The horse-power developed was 9,912, and the speed 19.52 knots. During the last half hour the speed from bearings was 20.17. An accidental circumstance occurring during the trial, caused an essential reduction in speed, and it is, therefore, probable that in her case, as well as in that of the *Philadelphia*, the ship will ultimately beat her own record.

It is no longer necessary, in considering the speed of the new ships of the Navy, to make comparisons with foreign vessels. We have now our own standard, and we have the right to congratulate ourselves that the standard is unsurpassed by any other navy in the world.

The *Newark* has been built by William Cramp & Sons. Her official trial is about to take place as this report goes to press.

The *Concord* and *Bennington* were each about half finished in March, 1889, under contract with N. F. Palmer, jr., & Co., of New York, the hulls being under construction at the Delaware Iron Works, Chester, Pa. A trial of the *Concord* took place November 18, 1890. The engines failed to develop the required horse-power, and another trial will shortly be had. The *Bennington* is nearly finished, and will receive her trial on December 20.

The completion of the *Miantonomoh* is only delayed by her ordnance and electrical plant. Three of her guns are in position, and the fourth will shortly be ready for trial. The ship will be ready for commission in about three months.

The next group of vessels consists of the four monitors, which have been in process of construction for many years without much prospect of reaching a final result in any ascertainable future period. For the first time in their history, the Department may now safely predict their speedy completion.

The *Puritan* has undergone a radical and most important change of design in the substitution of barbette for roller-base turrets, and of 12-inch for 10-inch guns. The change, requiring a new schedule of materials, involved further delays in this already much-delayed vessel, but it has added so greatly to her efficiency that it was worth waiting for. Proposals for the materials were received September 16, 1890, and contracts were awarded, upon the performance of which the work will be carried forward rapidly to a close.

The *Amphitrite*, now at the navy-yard, Norfolk, has undergone an alteration in plans by which she is to be completed in accordance with the plan of the *Puritan*. The old turret gear has been removed, as well as certain beams, bulkheads, and framing, and the ship is ready for the new work as soon as the material shall be delivered.

The *Monadnock*, at the Mare Island navy-yard, is also to be fitted with barbette turrets. Approved plans were forwarded March 26, 1890, and the alterations have progressed so far that the work can now be rapidly finished.

The *Terror* has undergone material alterations in design. The berth-deck beams have been replaced by heavier sections, and the berth-deck plating has been completed. The after turret is half finished, and the forward turret two-thirds finished. Further changes have been necessitated by the installation of the pneumatic system of turning the turrets, and the steering and refrigerating apparatus, all of which were contracted for by the Department April 25, 1888. This installation will be completed by next summer.

All the double-turreted monitors will be ready for their armor as soon as it can be delivered, and if there is no unforeseen cause of delay about the deliveries all will be in commission at some time in 1892.

The *Maine*, constructed at the Brooklyn navy-yard, stands in a class by herself. Her first keel-plate was laid October 11, 1888. The work on the vessel has been pushed with the utmost vigor, and she was launched successfully on the 18th of November, 1890. She is the first ship of her size ever built in a navy.yard, and her workmanship would reflect high credit upon any establishment. Three of her four 10-inch guns have been forged, and are in course of manufacture at the Washington Gun Factory. Her machinery, building by contract, is making good progress, and she has for some time been ready for her armor, the delay in obtaining it having necessitated a slight modification in design. If no further delay occurs in this respect, the ship will be in commission by July, 1892.

Of the vessels whose actual construction was begun subsequently to the commencement of this administration, the most important is the second-class battleship *Texas*, building at the Norfolk navy-yard. The keel was laid June 1, 1889, and although the work has been kept back by the non-delivery of material, the ship will, in all probability, be ready for launching in the summer of 1891.

The *Monterey*, building at the Union Iron Works, under contract of June 14, 1889, has undergone an entire alteration in the battery, two 12-inch guns having been substituted for the single 16-inch in the forward barbette, and two 10-inch for the single 12-inch in the after barbette. She will be ready for launching about January 1, 1891, and if her armor is promptly delivered, will be entirely finished early in 1892.

Of the five cruisers authorized in 1888, Nos. 7 and 8, named respectively the *Cincinnati*, and the *Raleigh*, and Nos. 9, 10, and 11, the first two are progressing satisfactorily at the navy-yards at New York and Norfolk, and the other three are under contract to be completed in May, 1892. The *Raleigh* and *Cincinnati* may be looked for about the same time, or perhaps earlier.

GUNBOATS.

In the last group, consisting of six vessels, the first designed were the two gunboats and the practice vessel. The advertisement of these vessels was published November 19, 1889, and proposals were opened January 22, 1890, as follows:

Bath Iron Works, of Bath, Me., for the construction of two gun-boats	$637,000
The Samuel L. Moore & Sons Company, of Elizabethport, N. J., for the construction of two gun-boats	562,875
Bath Iron Works, of Bath, Me., for the construction of one gun-boat	327,000
The Samuel L. Moore & Sons Company, of Elizabethport, N. J., for the construction of one gun-boat	285,000
Atlantic Iron Works, of Boston, Mass., for the construction of one gun-boat.	344,000
The Samuel L. Moore & Sons Company, of Elizabethport, N. J., for the construction of two gun-boats and practice vessel	562,875 245,325
The Samuel L. Moore & Sons Company, of Elizabethport, N. J., for the construction of one gun-boat and practice vessel	285,000 245,325
The Samuel L. Moore & Sons Company, of Elizabethport, N. J., for the construction of practice vessel	245,325

For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder: Atlantic Iron Works, of Boston, Mass., for the construction of one gun-boat, $344,000.

The proposal of the Samuel L. Moore & Sons Company, of Elizabethport, N. J., was the lowest received for the construction of the gunboats, and the only one for the construction of the practice vessel. Its bids could not, however, be considered, because the company did not then have and could not show that it would within three months from the date of the contract become possessed of the necessary plant for the construction of the vessels, as required by the acts authorizing them.

The bid of the Bath Iron Works, of Bath, Me., for the sum of $637,000 ($318,500 each), being the next lowest one received for the construction of the gunboats, was accepted, and contracts were entered into with that company April 12, 1890, for the construction of the gunboats on the Department's plans and specifications for hull and machinery. The contracts require that the vessels shall be completed and ready for delivery to the United States on or before the expiration of two years from the date of the contracts.

The practice vessel was again advertised on April 8, and proposals were opened June 10, 1890, as follows:

Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy.

F. W. Wheeler & Co., of West Bay City, Mich	$245,000
The Samuel L. Moore & Sons Company, of Elizabethport, N. J	250,000

Messrs. F. W. Wheeler & Co., of West Bay City, Mich., were the lowest bidders, but the Department could not, under existing treaty stipulations, award a contract for the construction of a vessel of war upon the Great Lakes, and their proposal was therefore rejected. The proposal of the Samuel L. Moore & Sons Company, of Elizabethport,

N. J., for $250,000, was the next lowest received, and the company having now satisfied the Department that it was possessed of the necessary plant for the construction of the vessel, a contract was entered into July 18, 1890, for the construction of the vessel upon the Department's plans and specifications for the hull and machinery. The contract requires that the vessel shall be completed and ready for delivery to the United States on or before the expiration of two years from the date thereof.

PROTECTED CRUISER NO. 6.

At the same dates as in the case of the practice vessel, the Department advertised and opened bids for the protected cruiser of 5,500 tons (No. 6), authorized September 7, 1888. The following bids were received:

Union Iron Works, of San Francisco, Cal., for the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy	$1,796,000
Union Iron Works, of San Francisco, Cal., for the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder	1,760,000

The Union Iron Works being the only bidder, their bid for the sum of $1,796,000 was accepted, and the contract awarded accordingly. The contractor subsequently agreed to lengthen the vessel by 10 feet, in order to secure more space in the fire-room, the cost of the change to be borne by himself. The contract, dated July 10, 1890, required that the ship should be completed and ready for delivery to the United States on or before April 1, 1893. The vessel has been laid down and the preparatory work is progressing satisfactorily.

Cruiser No. 6 belongs to the recognized cruiser type, but her greater size permits an expansion in those qualities wherein the ordinary cruisers are most defective—coal-endurance and sustained speed. Her coal capacity is 1,300 tons, which gives her an effective radius of 13,000 miles, a distance far in excess of the average vessel of this type. The additional weight of her machinery enables her to reach not only the guarantied trial speed of 20 knots, but a sustained sea speed of 19 knots, which is at least 2 knots in excess of that ordinarily maintained by ships of her class. Added to these advantages are unusual protection for the guns and a powerful battery, in which the rapid-firing feature is distinctly marked. The main armament consists of four 8-inch and ten 5-inch guns, while the secondary battery comprises fourteen 6-pounders, six 1-pounders, and four Gatlings; in all, fourteen heavy and twenty-four light pieces. A water-excluding belt worked in above the protective deck and 4 inches of armor protection for the guns and ammunition-hoists make the element of defensive strength one of the marked characteristics of this ship. The combination of sustained speed, exceptional coal endurance, powerful battery, and a certain amount of armor protection make her a cruiser of no ordinary character.

THE NEW YORK.

By far the most important vessel in this group, and in many respects one of the most important vessels of the new Navy, is the armored cruiser No. 2, named the *New York*, advertised and bid for on the same dates as the two vessels last mentioned. The bids on this ship were as follows:

Class 1.—Hull and machinery, including engines, boilers, and appurtenances, complete in all respects in accordance with the plans and specifications provided by the Secretary of the Navy:

The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa	$3,150,000
Union Iron Works, of San Francisco, Cal	3,100,000
Risdon Iron and Locomotive Works, of San Francisco, Cal	3,450,000

Class 2.—Hull and machinery, including engines, boilers, and appurtenances, complete in all respects in accordance with the plans and specifications provided by the bidder:

Union Iron Works, of San Francisco, Cal	$3,000,000
The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa	2,985,000

The proposal of Wm. Cramp & Sons for $2,985,000, being the lowest received, was accepted, and a contract was entered into August 28, 1890, for the construction of the ship according to the Department's plans and specifications for the hull and machinery, as modified by the bidder; the modifications embracing a re-arrangement of the boilers, so that additional longitudinal and transverse bulk-heads could be fitted in the engine and boiler spaces, thereby affording greater protection to the machinery, and rendering the vessel less vulnerable to attacks from rams and torpedoes. The keel was laid September 30, 1890, and the contract requires that the vessel shall be completed and ready for delivery to the United States on or before January 1, 1893.

The object which the Department has aimed at in the *New York*, and which, it is confidently believed, has been attained, is an unusual combination of great offensive and defensive power, with extraordinary coal-endurance, and a high rate of speed. All armored vessels, as has been repeatedly said, though it can not be said too often, are a compromise between the conflicting elements of battery, armor, endurance, and speed upon a given size or displacement. Increase one of these elements, the size remaining the same, and some one of the others must be decreased.

In the *New York* the speed given, 20 knots, is sufficient to enable her to escape from any more powerful ship afloat to-day, and to overtake the vast majority—certainly 95 per cent.—of all the ships of the world, naval or mercantile. At the same time her size and draught are not excessive. Her coal capacity permits her to complete without re-coaling a voyage of 13,000 miles. Her armored deck is 3 inches in the flat with 6-inch slopes; her sides have a complete belt of water-excluding material, and in the wake of the engine spaces 5 inches of armor, while four of her heavy guns are protected by 10-inch barbettes and 7-inch shields. Her battery, composed of six 8 inch and twelve 4-inch guns, is unequaled by any ship of the cruiser type in the world, while it gives her chances which are not to be despised should she be driven to a momentary encounter with a battle-ship. Fighting battle-ships, however, is not her business; she is built to keep the sea and thus destroy an enemy's commerce, and not only his commerce but any commerce destroyer he may send out. She is thus both a commerce protector and a commerce destroyer of the highest efficiency. Four such ships, distributed in various quarters, would put an effectual stop to the depredations of as many fleets of ordinary cruisers. For general purposes of service in war she is believed to have a wider field of usefulnes than any other ship yet designed for the Navy.

HARBOR-DEFENSE RAM.

The last vessel on the list is the harbor-defense ram, authorized by the act of March 2, 1889, after designs by Rear-Admiral Daniel Ammen, U. S. Navy. This vessel has an armored deck and sides. Her displacement is 2,050 tons, she is to have a speed of 17 knots, and she is intended solely for ramming purposes. The only projections above her armored deck are the conning tower, with 18 inches of armor, the ventilators of the smoke-pipes, and the hatch coamings. Advertisements were issued October 18, 1890, inviting proposals, which are to be opened December 20.

VESSELS AUTHORIZED BY THE PRESENT CONGRESS.

Until the year 1889, the modern additions to the Navy consisted chiefly of cruisers of from 3,000 to 4,500 tons, and of gun-boats of under 2,000. The projected armored vessels included the *Maine* and the *Texas*, battle-ships of the second class, and one harbor defense vessel, the *Monterey*. In the annual report of last year, the Department advocated a new departure in naval construction, and strongly urged the policy of building first-class battle-ships, as being by far the most important constituents of a defensive force, capable of effective use in time of war. Congress carried out this policy, and in the act of June 30, 1890, authorized the construction of three sea-going coast-line battle-ships.

Under the conviction that not a moment was to be lost in obtaining these vessels, deemed to be so vital to the defense of the United States, the Department gave urgent instructions to the Bureaus, and the latter, with a promptness unexampled in the history of naval administration in this country, actively set about the preparation of designs, in anticipation of the passage of the act. The result was that on the 1st of July, the day after the act was approved, the general plans were ready and the advertisements issued inviting proposals. The detailed plans were so pressed during the summer that not an employé of the Bureaus of Construction or Steam Engineering was allowed leave of absence, and on the 1st of October, exactly three months after the ships were authorized, bids for their construction were opened.

The bids were as follows:

Class 1.—For the construction of the hull and machinery including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy:

Union Iron works of San Francisco, Cal. (for one vessel)	$3,240,000
Risdon Iron and Locomotive Works of San Francisco, Cal. (for one vessel).	3,275,000
The William Cramp & Sons Ship and Engine Building Company of Philadelphia, Pa. (for one vessel)	2,990,000
Bath Iron Works, Limited, of Bath, Me. (for one vessel)	3,149,000
Union Iron Works of San Francisco, Cal. (for two vessels)	6,400,000
The William Cramp & Sons Ship and Engine Building Company, (for two vessels)	5,780,000
The William Cramp & Sons Ship and Engine Building Company (for the third vessel)	2,990,000

Class 2.—For the construction of the hull and machinery, including engines and boilers and appurtenances complete in all respects, in accordance with the plans and specifications provided by the bidder.

The William Cramp & Sons Ship and Engine Building Company (for one vessel)	$3,120,000
The William Cramp & Sons Ship and Engine Building Company (for two vessels)	6,040,000
The William Cramp & Sons Ship and Engine Building Company (for the third vessel)	3,120,000

The proposal (Class 2) of William Cramp & Sons was the only one received for the construction of the ships on the Department's plans as modified by the bidder. The modification consists simply in lengthening the vessel by 12 feet. Being the only proposal in this class, and being lower than the proposal of any other bidder in either class, for the construction of two vessels, namely, for the sum of $6,040,000 for both, or $3,020,000 each, it was accepted, and contracts were awarded to the company for the construction of the vessels upon the Department's plans and specifications, but increased in length by 12 feet.

The proposal of the Union Iron Works for the construction of one of the battle-ships upon the Department's plans, for $3,240,000, was greater by $120,000 than that of Cramp & Sons, and the Department informed the Union Iron Works that, in view of the requirement of the law that one of the vessels should be built on or near the Pacific coast, if it could be done at a fair cost, the contract for the third battle-ship, in accordance with the Department's plans, but like the other two lengthened 12 feet, would be awarded to that company as the lowest bidder on the Pacific coast, provided the company would reduce its price $60,000. The Union Iron Works agreed to accept the contract under these conditions, and it was accordingly awarded to that company for $3,180,000, which is only $60,000 more than the lowest bid on the Atlantic coast. This additional sum was considered reasonable in view of the increased cost, estimated by actual calculation, of the transportation of material necessarily obtained at the East.

The three vessels are required to be completed within three years from the date of contract, that is to say, in November, 1893. They are named the *Indiana* (No. 1), the *Massachusetts* (No. 2), and the *Oregon* (No. 3).

In these battle-ships the Department confidently asserts that the United States will become possessed of three vessels of the highest power, whose equal as fighting ships does not exist at the present day. The vessels being for purposes of coast-line defense, it was unnecessary to emphasize the feature of coal-endurance to the extent of any such extraordinary figure as has been attained in the *New York* and in No. 6, and still more in No. 12. This feature has not been slighted, however, for the radius of operation of the ship is 5,000 miles, equal to that of many cruisers; but it is not the principal feature. The first object of these vessels is to fight, and fighting machines they will be, of the highest efficiency.

As with coal endurance so with speed. The speed of the battle-ships has not been neglected, being 16.2 knots as a maximum and 15 knots sustained sea-speed, but it has not been made the main object. It is not a necessity, as in the case of cruisers; the duty of the battle-ships is to fight, not to run, and these ships will never have occasion to run from a hostile fleet of equal or even slightly superior numbers, whatever the vessels of which that fleet is composed. They are the first United States vessels, with the exception of those iron-clads which the War compelled us to obtain in advance of other states, of which this fact could be asserted.

The battery of the battle-ships is the heaviest and most effective in battle carried to-day by any ship afloat or projected, and its disposition is such as to make it tell with terrific effect. Above the armored deck, 80 feet from the center of the ship, rise two redoubts, inclosing the foundations of revolving turrets, within which are the four great 13-inch rifles, 18 feet above the water, and sweeping through a clear arc of 270 degrees, forward and aft and on both broadsides. Above these, on the heavy superstructure between the turrets, 25 feet above the water-line, and therefore capable of firing over the turrets, are eight 8-inch rifle-guns that at two miles can pierce the armor of many modern ships. Four 6-inch guns complete the main armament.

The secondary battery consists of sixteen 6-pounder rapid-firing guns, four 1-pounders, and four Gatlings, so disposed that a rain of projectiles can be thrown upon every point of approach, sufficient to destroy any light boat that may venture within range. The vessel also carries six torpedo tubes, two of them fixed at the bow and stern and four adjusted for training upon the sides.

The provision for defense is as thorough and effective as that for offense. A water-line belt of steel armor 18 inches thick and 7½ feet wide extends over three-fourths of the ship, turning in forward and aft where it sweeps around the base of the redoubts. At the ends are heavy under-water protective decks, sloping at the sides far below the water-line. An armored deck also extends above the space inclosed by the belt, and full use is made of all the modern devices to secure invulnerability—water-excluding material in the slopes of the protective deck, coal bunkers, and multiplicity of water-tight compartments.

The bow of the ship consists of a powerful ram, and both bow and stern above the protective deck can be entirely shot away without endangering the safety of the ship.

The Department submits this statement of the main features of these vessels with no further comment. It regards them with peculiar interest, for they were only acquiesced in upon its earnest solicitation, and in the face of many misgivings, to which free utterance was given both in Congress and in the press. As designed they challenge comparison with the battle-ships of the world. There are others in existence of greater size; none of greater power or efficiency. Nor can it be doubted by any one who has watched the progress of naval construction in America that their performance, when the work is completed, will equal the highest expectations that are formed of them to-day.

PROTECTED CRUISER NO. 12.

As in the case of the battle ships, the protected cruiser (No. 12) of 7,350 tons, authorized by the same act, was advertised on the day after the bill for its construction became a law, July 1, 1890, and bids were received and opened on the 1st of October. They were as follows:

Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy—

The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa	$2,725,000
Union Iron Works, of San Francisco, Cal	3,025,000

The proposal of William Cramp & Sons was the only one received that came within the limit fixed by the law, and was accepted, and a contract was signed accordingly on November 19, 1890, for the construction of the vessel, upon the Department's plans, to be completed within two years and six months from the date of the contract, that is to say, May 19, 1893.

In Cruiser No. 12, the Department has sought to produce a vessel absolutely without parallel among the war ships of the world. The combination here made unites a sufficient armament with complete protection against light guns, while at the same time the vessel will have a sea speed and a coal endurance hitherto unknown in ships of war. She will be a match for the most swift transatlantic liner afloat to-day, carrying any armament of which such a vessel ca [illegible] ble. No merchant vessel that she meets, armed or un [illegible] e from her.

The displacement of cr [illegible] is 7 [illegible] battery will be composed of one 8-inch [illegible] t 4 rapid-firing guns, twenty rapid-fire guns and six torpedo tubes. The heavy protective deck, 4 inches thick on the slopes and 2½ inches elsewhere, covers completely her vital parts, while a coffer-dam, 5 feet in width, is worked next to the side for the whole length, filled, in the central portion, with patent fuel capable of use in an emergency, and forward and abaft with water-excluding material. Four-inch and 2-inch plates in the wake of the rapid-firing and machine guns further protect the ship's side, while the 6-inch and 8-inch guns are protected by heavy shields attached to the carriages.

The machinery consists of three sets of triple-expansion engines driving three screws, the third screw being placed between and below the other two and 15 feet farther aft. With this triple reliance it is almost impossible to conceive of a combination of circumstances that would render the vessel helpless. A further advantage of the triple-screw device is that by simple arrangements any one of the three screws can be disconnected and left free to revolve, thus offering only a slight resistance to the progress of the ship when she is propelled by one or two engines.

When high speed is not essential, a small number of boilers can be used with high pressure and a single engine driven at its full power, thereby preventing the waste that is inevitable when a large engine is run at a low power. The engines are arranged in three separate water-tight compartments, each complete in itself and independent of the others, so that any two might be entirely disabled without interfering with the working of the third. By means of this machinery, the enormous horse-power of over 20,000 is developed, and the result is that the ship, by an arrangement as effective as it is economical, will be able to run with one screw and one-third power at 15 knots, with two screws and two-thirds power at from 18 to 19, and with three screws and full power at a maximum of 22 knots and a sustained average of 21.

Finally the coal capacity of the ship is fixed at 2,000 tons, which at 10 knots an hour, will give her an endurance of one hundred and three days, or a radius of action of 25,520 knots. She needs neither colliers nor coaling stations, for she carries both between her decks. In other words this ship, so powerful in offensive force as to equal all ordinary cruisers, so well protected as to be hardly vulnerable to the lighter class of guns, so abundantly supplied with separate engines as to be incapable of being wholly disabled, can steam completely around the world without touching at any point for coal, and without receiving fresh supplies from colliers; and yet when the occasion arises, she can overtake with ease the fleetest of the ocean greyhounds. Six such ships would exterminate the commerce of any country under the present conditions of commerce protection, and would thus, under these conditions, absolutely preclude an attack from a commercial state, however threatening in its demands, powerful in its armored fleet, or aggressive in its foreign policy.

There remain two items in the act of June 30, 1890, the torpedo-cruiser and the torpedo boat. The former is a fleet gunboat of 750 tons, required to develop a speed of 23 knots, with a premium for every quarter knot in excess; the latter will bear a general resemblance to the *Cushing*, and will be required to develop 24 knots, with premium for excess. Both were advertised October 18, 1890, and bids will be opened December 20 for the torpedo boat, and February 11, 1891, for the torpedo cruiser.

Of the four steam-tugs authorized by the act of March 2, 1889, one was purchased upon an offer received under the Department's advertisement of June 25, 1889. The bids for the others were rejected as being excessive, and a second advertisement was issued May 10, 1890, inviting proposals for the remaining three. No proposals were received under this advertisement.

It being apparent that the plans and specifications proposed by the Department called for a more expensive tug than could be built for the sum appropriated, viz, $35,000, with a fair margin of profit for the contractor, the specifications were modified and a new advertisement was issued September 3, 1890, under which the following proposals were received:

Name of bidder.	1 tug.	2 tugs.	3 tugs.
Globe Iron Works Company	....	....	$103, 500
The Pusey & Jones Company	$45, 000	$88, 000	129, 000
John H. Dialogue	....	....	99, 900
James Clark & Co	34, 500	68, 500	....
Neafie & Levy	33, 364	....	100, 000
Harrison Loring	....	....	97, 314
The Sam'l L. Moore & Sons Company	34, 500	68, 250	102, 000

The proposal of Harrison Loring being the lowest one received for the construction of all the tugs, was accepted, and contracts were awarded to him accordingly. The tugs are to be complete and ready for delivery within twelve months from the date of the contracts.

NAVAL REVIEW OF 1893.

Congress, in an act approved April 25, 1890, made the following provision for the holding of a naval review at the time of the Columbian Exhibition:

> SEC. 8. That the President is hereby empowered and directed to hold a naval review in New York Harbor in April, eighteen hundred and ninety-three, and to extend to foreign nations an invitation to send ships of war to join the United States Navy in rendezvous at Hampton Roads and proceed thence to said review.

The rapidity with which construction has proceeded during the past year and the promising outlook for the coming two years are such that if no delay is caused by failure of appropriations in the completion of the contracts now outstanding, the Department can safely present its list of vessels, which, with the exception of those required for service at the time, will take part in the projected review of 1893, the grandest naval demonstration that, up to that time, will have taken place upon the Western Hemisphere.

Name.	Type.	Tonnage.
ARMORED VESSELS.		
1st rate:		*Tons.*
New York	Cruiser	8,150
Maine	....do	6,648
Texas	Battle-ship	6,314
Puritan	Monitor	6,000
2d rate:		
Monterey	Monitor	4,003
Amphitrite	....do	3,815
Miantonomoh	....do	3,815
Monadnock	....do	3,815
Terror	....do	3,815
3d rate:		
Harbor-defence ram		2,050
UNARMORED VESSELS.		
1st rate:		
Cruiser No. 6		5,500
2d rate:		
Chicago	Protected cruiser.	4,500
Baltimore	....do	4,400
Philadelphia	....do	4,300
Newark	....do	4,083
San Francisco	....do	4,083
Charleston	....do	3,730
UNARMORED VESSELS—continued.		
2d rate—continued:		*Tons.*
Boston	Cruiser	3,189
Atlanta	....do	3,189
Raleigh	....do	3,000
Cincinnati	....do	3,000
3d rate:		
Cruiser 9	Cruiser	2,000
Cruise 10	....do	2,000
Cruiser 11	....do	2,000
Bennington	Gun-boat	1,700
Concord	....do	1,700
Yorktown	....do	1,700
Dolphin	....do	1,485
Gunboat No. 5	....do	1,000
Gunboat No. 6	....do	1,000
4th rate:		
Vesuvius	Dynamite-gun vessel	970
Petrel	Gun-boat	870
Practice vessel	....do	835
Torpedo cruiser	....do	750
Cushing	Torpedo boat	100
Torpedo boat No. 2		112

ARMOR.

The Department during the past year has experienced great disappointment in reference to the armor contract of the Bethlehem Iron Company. This contract, which was justly considered the crowning triumph of my predecessor, was signed on June 1, 1887, and called for the completion of a plant for the manufacture of armor two and one-half years from the date of the contract—that is, on December 1, 1889. It further provided for the delivery of 300 tons within two months from and after the expiration of the contract time for the completion of an adequate plant, delivery to be continued thereafter at the rate of 300 tons per month, and to be fully completed within two years from the date of such first delivery. On the date fixed by the contract the work of constructing the plant was far from completion.

The Department has endeavored during the past year, by every means at its command, including remonstrance, solicitation, and urgent request, to hasten the performance of the work. Repeated assurances have been given by the company, fixing various prospective dates, only to be followed by new disappointments. When it is considered that this contract includes the side and turret armor for all the monitors and for the *Maine* and *Texas*, the serious consequences of the delay are manifest.

In January, 1890, the company stated that they would be ready to begin manufacture within six months, and would be able to deliver from 1,500 to 2,000 tons this year; but this prospect ended, like previous ones, in disappointment. In July the company said:

> While the estimate, as stated in our letter of January 25, 1890, as to the time of beginning manufacture, was at fault, we are still expecting to commence within the next two months the manufacture of certain armor, for which we have received drawings, and which we understand is now urgently needed, namely: The bulk-head plates of the *Maine*, the conning tower of the *Terror* and the conning-tower communications of the *Texas*. As to the amount of plates that we hoped to deliver at the time of your interview, * * * we expected to be able to produce a considerable amount of *thick plates* with our present appliances, and added to this, if the protective deck plating covered by Exhibit U of our specifications were now needed by the Department, we could arrange to have a considerable portion of it rolled elsewhere and brought to our works for shaping, tempering, and fitting, and thus also in good part fulfill our statement as to the *amount* we could deliver during the present year.
>
> We are fully aware, however, that the deliveries above referred to are of the nature of temporary expedients, and that the end so earnestly desired by all parties concerned, and of paramount importance, viz, the completion of our hammer plant and the regular deliveries of the hammered and tempered plates for side armor, has been and will be delayed beyond our expectations.
>
> As is always the case in undertakings of such magnitude, the causes of delay have been numerous, and while no "unforeseen contingencies" have arisen of such a pronounced nature as to lead us at the time to formally draw the attention of the Department thereto, there have been several causes of serious delay which were beyond our control.

The date now fixed for the entire completion of the plant is July–September, 1891, nearly two years after the contract time.

At the present time it seems probable that deliveries may be made for acceptance-test as early as August, 1891, but under favorable circumstances the completed armor could hardly be ready before October 1, if then. This date may, therefore, be fixed as the earliest at which deliveries are likely to begin, and the completion of the *Maine*, the *Texas*, and the monitors is likely to be delayed accordingly. In the case of the *Maine*, a slight change has already been necessary in the design, to permit the work to go on, notwithstanding the non-delivery of the armor.

As early as July last it became evident that the first 300 tons of armor required by the Bethlehem contract would not be delivered prior to October 1, 1891, and that even after that date deliveries would be so slow as to postpone for many years the completion of the ships then authorized, if Bethlehem remained the sole reliance. To complete deliveries under the original contract at the prescribed rate requires two years; and though it is hoped that the company may be able to exceed this rate when fairly started, yet the fact is noted by the Department that 300 tons a month is the output of the largest manufactories of armor in England. At this rate the armor for ships now under construction, but not covered by the Bethlehem contract, amounting to about 14,000 tons, could not be fully delivered by this firm alone in less than six years from the present time, and the completion of ships would be delayed accordingly. It therefore became imperative for the Government to obtain the co-operation of another manufacturer and secure, as in the case of the gun forgings, the creation of a second plant for the manufacture of armor in the United States.

Accordingly negotiations were opened with Messrs. Carnegie, Phipps & Co., the largest steel manufacturers in the United States, if not in the world, with a view to the establishment of another plant; and an agreement has been concluded with this firm for the manufacture of 6,000 tons of armor, at the same price as in the contract of 1887 with Bethlehem, to be of all steel or nickel-steel, at the option of the Department. The contract binds the firm to begin the delivery of armor in June next, and to deliver 500 tons per month thereafter.

If both companies deliver at the maximum rate called for by the contracts it will require over two years from July, 1891, to complete the manufacture of the armor required for the ships now authorized, and some of them will be ready for it in advance of the time.

In July, 1890, the attention of the Department was attracted by an address delivered by Prof. James Riley, of Glasgow, on nickel-steel, before the Iron and Steel Institute, May 8, 1889. From an examination of the extraordinary results obtained and reported by Professor Riley, the Department became convinced of the important bearing of his discoveries on the question of the manufacture of armor, a point that received some attention in the article, and the accompanying discussion. Further investigation developed the fact that experiments had already been made in England, with plates of nickel-steel from 4 to 5 inches in thickness, and others in France with somewhat thicker plates. The latter experiments had been undertaken by Messrs. Schneider, the great manufacturers of all-steel armor for the French Government, but no complete and conclusive test was known to have been made. The United States Government was, therefore, the first in the field. Although requiring 20,000 tons of armor for its new fleet, not a pound of this armor had yet been manufactured, and it was therefore in a position to apply the results of the discovery to the armor of its entire new navy, including four of the five monitors. Negotiations were immediately opened by the Department with the Messrs. Schneider which resulted in a contract for the supply of a plate of nickel-steel 6 feet by 8 in size, and 10½ inches in thickness, for purposes of experiment.

In examining the competitive tests of different kinds of armor in Europe, the Department was impressed by the fact that these tests had been largely controlled by the manufacturers who furnished the plates, and were, therefore, not fully to be relied upon as indicating comparative merits. In some cases the tests were made for the benefit of the armor, and the gun used was carefully adjusted to the armor's known capacity of resistance. Other tests, equally untrustworthy, had been directed to proving the superiority of the ordnance, and in these the plate was adjusted with equal care to the necessities of the gun. The Department therefore determined to have a complete test, not only of the new plate, but of those varieties of armor at the time in the market and in actual use in different navies, namely, the all-steel armor of Le Creusot and the compound armor of Sheffield. Specimen plates of these makes of armor were therefore procured, and it was determined that the trials should be so conducted as to bring out the actual qualities of all the plates, and to arrive at the truth, so far as it could be ascertained by a single test.

The agents of the firms interested deprecated the use of the 8-inch gun on the ground that it would destroy all the plates, and afford no tests for comparison. As, however, the Department was now the owner of the plates, and as its object was a thorough trial which should set at rest all doubts, it was in a position to use its own tests, whatever might be the consequences to the reputation of the different kinds of armor. It was, therefore, decided to fire, first, the 6-inch gun at the corners of the plates, and subsequently to try the 8-inch gun on the center.

The trials took place at the proving ground at Annapolis September 18–22, and were in the highest degree instructive. The 6-inch gun proved to be superior to the English compound plate, which was completely perforated and practically shattered by four shots. In the case of the other two plates, the resistance of the armor was superior to the performance of the gun, and to complete the test it became necessary to use a higher caliber. The 8-inch gun was accordingly fired at all the plates, with the result that the projectile destroyed the compound plate, and broke the all-steel plate into four separate pieces, held together only by the fibers. The nickel plate, though slightly more penetrable, remained absolutely uncracked; the apertures made in it were plugged by the projectiles, and for all practical purposes of protecting a ship it was as perfect at the close of the trial as if no shot had been fired.

In view of the great superiority, shown at this trial, of the nickel plate over the others in use at the present time, Congress, at the request of the Department, made an appropriation of one million dollars, with which to purchase nickel matte. Before entering upon extensive purchases, the Department has thought it wise to make still further tests, and with this in view a limited quantity of nickel, amounting in value to about $50,000, has been purchased. No more will be procured until complete experiments have been made.

The vice of the all-steel armor is its tendency to crack. This liability to crack at shock or perforation seems to be removed by an alloy of about 5 per cent. of nickel. The mixture enhances to a noticeable degree the qualities of elastic limit and tensile strength, leaving the percentage of elongation at a figure which makes cracking almost impossible. These qualities are precisely those necessary in armor plate. Another peculiar feature, whose bearings and causes are not yet fully ascertained, is the retention of the projectile in the aperture which it makes in the plate. The substance of the metal appears to seize upon the projectile and hold it fast, thereby closing the very shot-hole that it opens. Striking as these characteristics are, the Department has no disposition to adopt hasty conclusions, however sensational their character, upon imperfect or inadequate trials, and proposes to continue its experiments until absolute demonstration has been reached.

In view of the special qualities which nickel steel has apparently developed in its application to armor, and of the possibility that results of equal importance may be accomplished by the employment of alloys of varying proportions for other purposes, the Department has directed the Bureau of Ordnance to institute experiments with small samples of nickel steel, varying in their composition, for the following purposes:

(*a*) Construction plate similar to that used in ship-building.
(*b*) Boiler plate.
(*c*) Construction plate which shall be used in a comparative test with the ordinary steel plate, as to its non-fouling qualities, when used as bottom-plates of steel vessels.
(*d*) Metal for projectiles.

ORDNANCE.

The following table gives the number of sets of forgings so far ordered, the number of guns completed, and the number of guns now under construction at the Washington Gun Foundry:

Caliber.	Forgings ordered.	Completed guns.	Guns under construction.
4-inch	35	4	12
5-inch	4	2	
6-inch	128	77	25
8-inch	35	15	2
10-inch	25	4	3
12-inch	8		
13-inch	12		

Of the above guns, the 4-inch and 5-inch may properly be classed as "rapid-firing guns," employing fixed ammunition, that is to say, having the cartridge-case, charge, and projectile combined in one. The 5-inch gun is the largest that present investigation and experience indicate as properly adapted to the quick-firing feature. The combined weight of the cartridge-case, charge, and projectile in this gun is estimated not to exceed 100 pounds, which can be handled without difficulty. Beyond this it is inexpedient to go, as the great weight of the projectile prevents the rapidity of fire which is this gun's essential feature. A specimen of the 4-inch gun has been completed and tried, and has given highly satisfactory results, two types, differing in their breech mechanism, having been manufactured.

The adoption of rapid-firing guns of large caliber has made it necessary to develop a plant for the manufacture of suitable cartridge-cases, and an agreement has accordingly been made with the Winchester Repeating Arms Company, of New Haven, Conn., to supply 15,000 cases, with the option to the Department to order 10,000 more at a reduced price. The company has nearly completed the machinery necessary for making these cases, and their delivery will soon begin.

Passing to the heavy guns, the first is the 6-inch, the length of which has been increased from 30 to 35 calibers. The performance of the new gun is satisfactory, and specimens will soon be made with a still longer bore, a gun 40 calibers in length having been designed for this purpose.

Of the 8-inch guns, six of the new design, 35 calibers in length, have been manufactured, tested with good results, and issued, and a new 8-inch gun, 40 calibers in length, has been designed which it is proposed to mount on cruiser No. 12. The great advantage of this gun, as of all long guns, is the flat trajectory of the projectile, due to its high velocity, which makes it possible to use the gun successfully at ordinary battle range without accurate measurement of distance.

Of the 10-inch guns, four that make up the armament of the *Miantonomoh* are completed, and three of the four for the *Maine* are in an advanced stage of manufacture.

No 12-inch guns have yet been made, but forgings for one gun have been received from the Bethlehem Iron Company, and the Gun Factory is ready to proceed with the manufacture of these guns as fast as forgings are delivered.

The design for the first 13-inch gun, 35 calibers in length, has been completed, and the tools for its manufacture are in course of construction. Twelve sets of forgings of this size have been ordered from the Bethlehem Iron Company for the batteries of the three new battle-ships.

All contracts with private firms for the manufacture of heavy guns have been completed in the course of the past year, and the guns have been proved and issued to the service. No further contracts of this character will be made with private firms, the capacity of the gun foundry at Washington being sufficient to handle forgings as fast as they will be received.

The ordnance work of the past year has included the completion and installation of the armaments of the *Baltimore*, the *Philadelphia*, the *San Francisco*, and the *Miantonomoh*, while those of the *Newark* and *Concord* are ready.

The 8-inch guns of the *Charleston* are also ready, and will replace four of her 6-inch guns on her return. The manufacture of a new armament for the gunnery ship *Lancaster* has been begun. It is believed that with the increased rapidity of delivery of forgings from the Bethlehem and Midvale Companies and the development of the Washington Gun Foundry, batteries can hereafter be furnished to new ships as fast as the latter are completed. The Midvale Company is now engaged in putting up a plant for forgings of large calibers and by the early part of next year will probably be able to do machining up to 10-inch guns, and to cast and forge up to 13-inch. There will, therefore, be two firms in the United States ready to supply any gun-forgings that are likely to be needed.

The improvements at the Gun Foundry during the past year include the erection of the 110-ton overhead traveling-crane, the completion of the shrinkage-pit, gun-carriage shop and office building, the construction of a railway siding from the Baltimore and Potomac railroad which has greatly facilitated deliveries and shipments, and the purchase of a shifting engine and of several special machine tools.

I desire to call particular attention to the extraordinary reduction in the cost of making guns and carriages which the Gun Factory has accomplished. The tables given below make a comparison of the average cost of the 6 inch, 8-inch, and 10-inch gun manufacture, first, under the old contracts with private firms; secondly, at the Washington Gun Factory in 1888, and finally, at the same place, in 1890, from which it appears, to take a single example, that the 8-inch guns, for manufacturing which the Government, under the old contract, paid $8,500 per gun, aside from the cost of forgings, were manufactured by the Washington factory in 1888 for $5,163, and in 1890 for $2,772.

A similar reduction is to be noticed in the cost of 6-inch carriages, the average of the first ten manufactured being $6,556, and the last ten $2,824, a reduction chiefly in labor, as the material, though diminished in cost, has not shown a proportionate variation.

The tables are as follows:

GUNS.

Caliber.	Average cost of manufacture.			Average time of manufacture in 10-hour days.	
	By contract with private firms.	Washington Gun Factory.		Washington Gun Factory.	
		1888.	1890.	1888.	1890.
6-inch	$3,400	$2,649	$1,298	115	60
8-inch	8,500	5,163	2,772	225	120
10-inch		6,334	3,500	240	164

6-INCH CARRIAGES.

	Labor.	Material.	Total cost.
Average of—			
First 10	$4,423.10	$2,133.21	$6,556.31
Second 10	3,027.41	1,283.32	4,310.73
Third 10	2,250.74	1,191.35	3,442.09
Fourth 10	1,968.05	1,344.67	3,312.72
Fifth 10	1,708.00	1,116.00	2,824.00

The act approved June 30, 1890, appropriated, for the purpose of enabling the Secretary of the Navy—

> To manufacture and experimentally test, under rules and conditions to be prescribed by him, a submarine gun and projectiles for the same, $30,000: Provided, that no part of this money shall be expended until the owners of the patents to be tested under this provision shall agree by contract to give the Government the option, within a specified time, to contract, at such price as shall be satisfactory to the Secretary of the Navy, for the exclusive right on the part of the Government to manufacture, by contract or otherwise, such submarine guns and projectiles without the payment of any royalty on the same: Provided, that such submarine gun and projectiles shall prove satisfactory, on due test, and be approved by the Secretary of the Navy.

In pursuance of this act, the Navy Department, under date of the 19th of September, 1890, entered into contract with the Ericsson Coast Defense Company for one submarine gun and six steel projectiles, the gun and projectiles to be fixed and secured in position on board the steam-vessel known as the *Destroyer.*

It is proposed to make a thorough test of this system of submarine artillery, which possesses undeniable advantages, if applied to special types of vessels, such as the ram designed for work at close quarters. The experiments will be conducted at the torpedo station at Newport.

Cast-iron common shell and shrapnel have been manufactured at Washington and supplied to the new ships as fast as needed. The manufacture of cast-steel common shell has been discontinued for the present, the results obtained not having proved satisfactory. Efforts have been made to develop in this country a process of making common shell of forged steel, as this shell possesses marked advantages, and it is hoped that before long specimens may be obtained for test and that the manufacture may be domesticated in the United States.

The specimens of armor-piercing projectiles hitherto received from private firms in this country, tempered by various processes, have not proved satisfactory, and the only present prospect of securing what we need is by the adoption of some one of the processes in use abroad. A contract has been made for a quantity of projectiles to be manufactured in America by one of these processes, and the Department is still endeavoring to bring about some arrangement by which it may obtain other armor-piercing shells of the best quality of American manufacture.

The great number of inventions, possessing more or less merit, in the way of light rapid-firing guns, has multiplied the number of types in use in all the navies of the world. The manifest disadvantage of this extreme diversity of types, each with its special ammunition, on board a single ship, has led the Department to look with favor upon a plan to limit the smaller rapid-firing pieces to the 6-pounder and 1-pounder calibers, and to abandon as fast as is practicable the 3-pounders and the 47-millimeter and 37-millimeter revolving cannon.

The Driggs Ordnance Company has begun work on the ten 6-pounder and ten 3-pounder guns and ammunition ordered last year.

The Hotchkiss Ordnance Company has filled its original contract with the Department for ninety-four Hotchkiss guns and ammunition, with the exception of steel shell for the 6-pounder and 3-pounder, in the manufacture of which, of the proper quality, considerable difficulty has been experienced. Deliveries have also been made under later orders.

TORPEDOES.

This country has been thus far absolutely without a successful automobile torpedo. This fact has been referred to more or less from time to time, in reports and papers, for several years past, but it does not seem to have received the attention which its gravity demanded. Vague hopes and expectations that something would turn up gradually fixed themselves upon the Howell torpedo as the probable solution of the problem, although it was still in an experimental state. Finally, on January 5, 1889, a contract was made with the Hotchkiss Ordnance Company, the manufacturers of this weapon, for thirty torpedoes, of which ten were to be delivered by June 1, 1890, and all by September 1 of the same year. This contract has not yet been filled, owing to the loss of two torpedoes at preliminary trials and the failure of the company thus far to produce a weapon that fulfills the requirements of the contract. An extension of the contract time has been granted, and the manufacturers hold out expectations that they will be ready for another trial and for making deliveries by the 1st of January, 1891

Notwithstanding these expectations, the necessity of possessing a practical torpedo was so great and the question whether the Hotchkiss Ordnance Company would be able to produce one answering the requirements of the contract so doubtful, that the Department would have fallen short of its duty had it not made an effort to meet, in some other way, the necessities of the situation. Negotiations have therefore been undertaken with the Whitehead Torpedo Company with a view to domesticating the manufacture of their torpedo, the most successful yet produced in the world. Favorable terms have been made and an order will shortly be placed with an American firm for a number of Whitehead torpedoes. If the Hotchkiss Company shall finally succeed in producing a torpedo to answer the necessary conditions, the two designs will be subjected to competitive tests, with a view to ascertaining the expediency of definitely adopting one or both of them for service use. In the meantime the Bureau is continuing its investigations with other designs.

Of torpedoes other than auto-mobile, one, of the Patrick design, a torpedo electrically directed from the shore, has undergone a successful test. Two others remain to be supplied to complete the three ordered February 25, 1889. It is proposed to use these torpedoes for purposes of instruction in connection with the Naval War College.

STEEL INSPECTION.

In view of the delays that have been experienced by the Department and by ship-builders engaged upon contract work, in obtaining materials, the Department invited the representatives of the principal ship-building firms on the one hand, and of steel-casting companies, rolling-mills, and manufacturers of steel forgings on the other, to a conference, which was held at the Department October 16, 1890. The statements made on both sides as to the causes of delay were full of instruction. Various causes were mentioned, most of them relating to the method of inspection, and including especially the inadequate number of the force of inspectors, the length and multiplicity of the tests, and the inflexible rules by which adherence to the letter of the specifications was exacted. In some cases objection was also raised to certain tests, among them the phosphorus and sulphur tests, but more particularly the tests for surface defects.

In order to meet the former class of objections, the Department is now taking steps to increase the force of inspectors and simplify and hasten the work of inspection, and to lay down rules of interpretation that will admit of the exercise of a reasonable judgment on the part of the inspectors. As was stated at the opening of the conference, the Department has no intention of modifying in any way the standard of steel already adopted, and it is satisfied that by the measures thus taken the causes of delay will be largely if not wholly removed.

SHIPS IN COMMISSION.

The North Atlantic squadron, under the command of Rear-Admiral Bancroft Gherardi, consists of the *Philadelphia*, *Dolphin*, *Petrel*, *Enterprise*, and *Vesuvius*, and has been occupied with American interests in West Indian and Central American waters.

The *Baltimore*, upon her first commission, relieved the *Galena* as flag-ship until July last, when she was assigned to the duty of carrying the remains of the late Captain Ericsson to Sweden; since that date the new cruiser *Philadelphia* has been the flag-ship of the squadron.

The boilers of the *Galena* and *Yantic* having become unserviceable, these ships have withdrawn from the squadron for repairs.

The *Baltimore*, having landed the remains of the late Captain Ericsson, at Stockholm, has proceeded to the Mediterranean, and is now the only vessel upon that station, the *Enterprise* having returned to the United States in July last.

The squadron of evolution, consisting of the *Chicago*, *Boston*, *Atlanta*, and *Yorktown*, under the command of Acting Rear-Admiral John G. Walker, remained in European waters until May last, when it proceeded to Brazil on a visit of compliment and friendship to that Republic, returning to New York at the end of July.

The South Atlantic squadron remained under the command of Acting

Rear-Admiral James H. Gillis, with the *Richmond* as flag-ship, until May last, when he returned to the United States. The squadron now consists of the *Pensacola*, *Essex*, and *Tallapoosa*, and is under the command of Acting Rear Admiral William P. McCann.

The Pacific squadron consists of the *Charleston*, *Mohican*, *Iroquois*, and *Ranger*, under the command of Acting Rear-Admiral George Brown, and has been looking after the interests of the Government in the waters of the Hawaiian and Samoan Islands. The *Alert*, *Nipsic*, *Adams*, and store-ship *Monongahela* have been put out of commission for necessary repairs.

The Asiatic squadron consists of the *Omaha*, *Swatara*, *Monocacy* and *Alliance*, under the command of Rear Admiral George E. Belknap. The *Marion* returned to the United States in May last, and was put out of commission at the Mare Island navy-yard for repairs.

The *Pinta* has continued on special duty in Alaskan waters, the *Michigan*, upon the Lakes, the *Despatch* and *Fortune* upon our coast, and the *Thetis* on surveying duty in the Pacific. The scarcity of vessels on the Pacific station made it necessary to withdraw the *Ranger* from surveying duty and assign her to the Pacific station, where she has been employed, part of the time in company with the *Thetis*, in the waters on the west coast of Central America.

The training squadron, consisting of the *Jamestown* and *Portsmouth*, has made the usual cruise in the West Indies and Europe.

PERSONNEL.

The number of rear-admirals is too small for the needs of the service, and I recommend that it be increased from six to ten.

Of the reductions made in the numbers of the naval personnel, by the acts of Congress of July 15, 1870, and August 5, 1882, the first was adopted at a time when the material of the Navy was in a state of rapid decline, both in the number and quality of ships, and the second when it had touched the lowest point. The transformation and rapid development of the fleet which has taken place in the last six years, make it absolutely necessary to call for a new adjustment in certain branches of the personnel, in order to keep up a reasonable standard of efficiency among the officers of the Navy.

The situation of the lower part of the list of line officers from the grades of lieutenant to ensign is so serious as to be little less than alarming. At the present rate of promotion these officers bid fair to pass their lives in the junior grades. The average age of the five officers now at the head of the list in each of these grades is as follows:

	Y.	Mo.
Lieutenant	44	1
Lieutenant, junior grade	34	5
Ensign	32	7

This is bad enough, but the situation during the next few years is growing rapidly worse, and actual calculation shows that, at the average rate of promotion, the officers now at the foot of these three grades will only be promoted out of their grades at the following ages:

	Years.
Lieutenant	54
Lieutenant, junior grade	37
Ensign	33

The spectacle will thus be presented, at a time not very far distant, of the whole grade of lieutenants in the Navy composed of men between the ages of thirty-seven and fifty-four. During all this period they can only have a subordinate responsibility, although they have reached an age when many men are almost ready to retire from the pursuit of an active career. They are still in leading-strings, always compelled to refer even unimportant questions to their seniors, dragging out the miserable existence of a subordinate whose energies have been sapped, whose ambition is gone, and who has learned from long experience to evade and shirk responsibility.

The absurdity of this arrangement is shown by the fact that after spending forty years of his life in inferior positions the lieutenant has but eight years left in which to pass through the highest grades before retirement. When he reaches a position of responsibility he is no longer fitted for it, and he is, therefore, as incapacitated for efficient service during his short period of command as he was during his protracted career of subordination. If this practice continues, the Government will soon find itself possessed of a fleet of the highest qualities placed in the hands of a body of officers originally inferior to none in the world, but with a capacity that has been dwarfed and stunted by the results of this restrictive legislation.

As a partial remedy the Department proposes that the number of lieutenant-commanders be increased from 74 to 124, and the number of lieutenants be diminished in like proportion; and that the number of lieutenants of the junior grade and of ensigns be more nearly equalized.

In connection with this subject I would strongly urge that the bill (S. 540) now pending in Congress to amend the statutes relating to the naming, rating, and command of vessels be so amended that second rates may be commanded by captains or commanders, third rates by commanders or lieutenant-commanders, and fourth rates by lieutenants; thus obviating the hardships which the bill in its present shape would impose upon junior officers.

PERSONNEL—ENGINEER CORPS.

Of equal importance with the above changes is the demand for an increase in the numbers of the Engineer Corps. At present there are not enough engineer officers in the Navy for ordinary working purposes, and if no additional ships were building an enlargement of the corps would be necessary. The important additions that are now being made to the fleet emphasize still further the urgent necessity of immediate action. The engines of the new ships, with their great complexity and delicate adjustment, require the highest kind of expert treatment, and unless a sufficient force is provided the safety of the ships will be seriously endangered. A bill for this purpose has been introduced in Congress, which provides also for the selection of a certain number of graduates of technical schools for appointment in the Engineer Corps. With the general principles underlying this bill the Department heartily concurs, and it earnestly asks that action may be taken upon it at the coming session.

NAVAL MILITIA.

One of the most vital defects in our present naval system is the want of an organized militia, so trained that in case of necessity it will be prepared to supply the demands of the naval service. The number of seamen now allowed by law is 7,500. Most of them at any given time are necessarily scattered. They would not be available at all in an emergency, nor would they in any case be numerous enough to form more than the nucleus of an active force.

At the outbreak of the civil war there were only two hundred seamen on the Atlantic coast at the disposal of the Government for the crews of ships fitting out. Largely in consequence of this, naval operations during the first six months were delayed and obstructed. The necessities of war afterwards increased the force to fifty thousand. Most of the new recruits were destitute of naval training, and to obtain even these it was necessary to pay heavy bounties.

The want of a supply of men in reserve, places the Navy at a great disadvantage as compared with the Army. The Army has always behind it a well-trained militia, which makes its real numerical strength. Without this it would be a feeble instrument of national defense. The Navy needs its reserves as much as the Army, and they should be composed not only of trained seamen, but of trained naval seamen.

The development of the militia is in the interest of a true economy. Its cost to the General Government lies only in arms and equipment for training. The remainder of the expense is voluntarily borne by the States. Compared with the cost of a regular force of the same size this expense is little more than nominal, as the periods of active employment are confined to what is required for training purposes alone.

It is the true American principle that the standing forces of the Government, military or naval, should be kept on the smallest possible footing consistent with the requirements of defense. But it is essential to the maintenance of this principle that there should be a body of trained citizens back of the small standing force which will be ready to meet an emergency. The United States has no use for a large body of men, drawn away from productive labor and consuming their time in a permanent army or navy, but it requires that provision should be made for recruiting both branches of the service in case of necessity directly from the people.

Until recently no steps have been taken towards the creation of a naval militia; but within the last two years an active interest in the subject has developed itself, not only on the seaboard, but on the interior waters and on the Pacific, and a spontaneous movement has taken shape in the passage by several States of acts for the establishment of a naval militia. In some cases successful organizations have been already formed, and all that is required is such action on the part of the General Government as will put the naval militia on the same footing as the land militia, namely, the issue of arms and equipments. Other States are tending in the same direction in response to an active popular demand, and there is every reason to believe that with proper encouragement from the Department, and no other action by Congress than an appropriation for the supply of arms, the creation of a naval militia will be assured.

It is clearly in the interest of sound policy that a demand of this kind springing directly from the people and closely concerning them, should meet with a hearty co-operation on the part of the Government, and that a general disposition thus aroused and expressed should not be suffered to die from delays and discouragement. The naval militia of the country now actually in existence should be put on the same footing as the land militia. A bill with this object was introduced at the last session of Congress, and I earnestly recommend its passage.

The naval militia organization in New York has been permitted to drill on board the *Minnesota*, and the organization in Boston on board the *Wabash*. The latter drill lasted several days, and was equivalent to the annual encampment of the land militia. Landing and boat drills also took place at selected points in the neighborhood of Boston, and the organization developed a high degree of spirit and energy in its members.

In connection with the subject of a naval militia, I would call attention to the advantage of providing a place in its ranks for persons of special acquirements demanded by the naval service, but of a character somewhat outside of the ordinary scope of professional training. The extensive employment of electricity in its applications on ship-board makes it necessary for naval officers to acquire a certain amount of electrical knowledge, but it is impossible for all, or even for any great number of them, to become expert electricians, nor is it desirable that they should do so at the expense of other branches of their profession of more pressing importance. To meet this want, it is suggested that a corps of naval electricians be established in the different States that have created a naval militia, to be attached to this militia and to receive the naval training which it is the great object of the militia to give.

By this means a corps of electrical specialists would be organized, familiar with the needs and usages of the naval service, and the extended applications of electricity to naval vessels would be rapidly developed in time of peace as well as in war. In the latter contingency the corps would be especially valuable in fitting out new vessels with electrical apparatus, and in taking charge of the electrical plant on board ships in commission. The number of officers available in an emergency would thus be increased, as those now detailed to electrical work could be assigned to other duties, and their work could be carried on by the experts of the naval militia.

ESTIMATES AND APPROPRIATIONS.

The general estimates for the support of the Navy, including public works, and of the Marine Corps, have been cut down to the lowest possible point, and show a total of $1,352,594.56 less than the estimates of last year and $155,876.30 less than the appropriations for the current year.

On the other hand, the estimates for increase of the Navy show an enlargement far beyond that which has taken place in any prior year. The estimates for this purpose for the year ending June 30, 1891, were $9,386,500; the estimates for the current year are $18,471,229, or nearly double the amount. By far the largest part of this increase is for payments upon outstanding contracts.

The appropriations under this head for the current year fell short of the amount estimated therefor by $1,266,500. The appropriations as well as the estimates were doubtless based on the supposition that at the ordinary rate of progress in naval construction the reduced amount would be sufficient, and that the ships newly authorized would require nothing during the current year. As a result, the appropriation will undoubtedly fall short by about $1,600,000 of the amounts required to continue the work of construction now in progress. This amount, which is properly a deficiency charge upon the appropriation for the current year, should be deducted from the total estimate named above, leaving the amount under increase of the Navy properly chargeable to 1892, $16,871,229, as against an appropriation for the current year (including the above deficiency) of $9,720,000.

Partly in explanation of these figures, and partly as a fact in itself worthy of the most careful study and application, the Department would call attention to the practice which has obtained hitherto in the building of new ships, of authorizing construction without making any provision for payment beyond that which the calculations for the coming year show to be immediately necessary, and generally with the assumption that during the first year after a ship is authorized no payments will be required. Thus the act of June 30, 1890, authorized the Department to undertake immediately the construction of three great battle-ships, one protected cruiser, one torpedo cruiser and one torpedo boat, and defined approximately the total cost of the vessels by fixing a limit, but made no appropriation therefor, upon the assumption that no work would be done before July, 1891. It surely could not be the intention of Congress that the Department was to protract and delay the construction of these authorized vessels until a new year should have furnished new estimates for appropriations to cover their cost; nor need it offer any apology for its promptitude, in beginning the construction of these vessels, under the authority given by the statute, within three months after they were authorized.

The result of this system, of neglecting when contracting an indebtedness to provide for paying the bills, is shown in the estimates for the coming fiscal year. Owing to the large accumulation of vessels uncompleted, some of them not yet begun, which the present administration of the department found in March, 1889, awaiting its action, together with a number of large vessels authorized in the act of last summer, all of which have been got under way, an immense banking up of contract work in the fiscal year 1892 has taken place for which Congress is now called upon to appropriate. Some of these vessels were authorized by acts as early as 1886, others in 1887, 1888, and 1889. The monitors belong to a still earlier period. Had the Congresses, which authorized the vessels now under construction, appropriated the money to pay for them at the time they were authorized, neither the estimates nor the appropriations for the coming year would have shown any increase whatever.

It must be remembered that the money appropriated for increase of the Navy is only drawn from the Treasury as the progress of the work, carried on under contract or at the yards, calls for its payment. Until that time it remains untouched. The appropriation for the construction of ships at the time of their authorization would thus make no alteration in the drafts upon the revenues, while the Department would be able to proceed with its work in the full assurance that the balances to its credit are sufficient for meeting its obligations.

Comparative exhibit of estimates and appropriations, 1891 and 1892.

Detailed objects of expenditure, and explanations.	Estimates, 1891.	Appropriations, 1891.	Estimates, 1892.	
General establishment:				
Pay of the Navy	$7,656,312.00	$7,250,000.00	$7,314,742.00	
Pay miscellaneous	240,000.00	240,000.00	240,000.00	
Contingent, Navy	7,000.00	7,000.00	7,000.00	
				$7,561,742.00
Bureau of Yards and Docks:				
Ordinary expenses	488,081.32	627,101.04	692,606.89	
Public works	1,308,755.00	797,930.00	523,375.13	
				1,215,982.02
Bureau of Navigation:				
Ordinary expenses	164,900.00	117,250.00	135,750.00	
Naval Academy	281,617.45	239,017.45	213,965.45	
				349,715.45
Bureau of Equipment	1,128,625.00	951,025.00		1,044,025.00
Bureau of Ordnance	279,224.00	378,624.00		480,041.25
Bureau of Construction	1,194,972.50	1,319,972.50		1,019,972.50

Comparative exhibit of estimates and appropriations, 1891 *and* 1892—Continued.

Detailed objects of expenditure, and explanation.	Estimates, 1891.	Appropriations, 1891.	Estimates, 1892.	
Bureau of Steam Engineering	$1,000,070.00	$827,900.00		$789,105.00
Bureau of Provisions and Clothing	1,350,392.53	1,183,532.03		1,242,532.03
Bureau of Medicine and Surgery	159,500.00	138,600.00		140,500.00
Marine Corps:				
Pay Department	697,492.27	687,471.79	$707,725.01	
Quartermaster's Department	255,811.72	250,611.72	308,818.97	
				1,016,543.98
Total running expenses	16,212,753.79	15,016,035.53		14,860,159.23
Increase of the Navy.				
Bureau of Yards and Docks			200,000.00	
Bureau of Equipment			400,000.00	
Bureau of Ordnance	4,266,500.00	2,645,000.00	4,158,850.00	
Bureau of Construction and Repair	4,000,000.00	5,475,000.00	8,855,433.00	
Bureau of Steam Engineering	1,120,000.00		4,856,946.00	
Total increase of Navy	9,386,500.00	8,120,000.00		18,471,229.00
Grand total	25,599,253.79	23,136,035.53		33,331,388.23

Appropriations, expenditures, and balances, fiscal year ending June 30, 1890.

	Appropriations for fiscal year ending June 30, 1890.	Amount drawn fiscal year ending June 30, 1890.	Balances undrawn June 30, 1890.	Balances undrawn October 31, 1890.
Pay of the Navy	$7,250,000.00	$6,137,490.72	$1,112,509.28	$851,300.90
Pay, miscellaneous	225,000.00	219,999.87	5,000.13	6,633.74
Contingent, Navy	7,000.00	3,870.28	3,129.72	2,091.46
Marine Corps:				
Pay of the Marine Corps	685,708.35	596,317.98	89,390.37	69,978.90
Provisions	63,863.25	63,863.25		
Provisions, deficiency, appropriated by act September 30, 1890	754.39			
Clothing	65,000.00	64,809.35	190.65	3,140.83
Clothing, deficiency, appropriated by act September 30, 1890	9,927.00			
Fuel	18,000.00	17,975.85	24.15	2,464.02
Fuel, deficiency, appropriated by act September 30, 1890	3,330.12			
Military stores	12,000.00	11,984.16	15.84	15.84
Transportation and recruiting	10,000.00	9,976.74	23.26	515.59
Transportation and recruiting, deficiency, appropriated by act September 30, 1890	500.00			
Repairs of barracks	16,780.00	16,767.69	12.31	
Forage	3,500.00	3,500.00		
Forage (deficiency, appropriated by act September 30, 1890)	317.80			
Hire of quarters	6,624.00	6,564.00	60.00	60.00
Contingent	27,500.00	27,360.19	139.81	90.69
Contingent (deficiency, appropriated by act September 30, 1890)	2,968.71			

Appropriations, expenditures, and balances, fiscal year ending June 30, 1890—Continued.

	Appropriations for fiscal year ending June 30, 1890.	Amount drawn fiscal year ending June 30, 1890.	Balances undrawn June 30, 1890.	Balances undrawn October 31, 1890.
Naval Academy:				
Pay, Naval Academy	$104,013.45	$103,157.85	$855.60	$896.65
Special course	5,000.00	2,199.41	2,800.59	2,861.59
Repairs	21,000.00	18,751.17	2,248.83	3.43
Heating and lighting	17,000.00	15,744.61	1,255.39	41.73
Furniture for cadets' quarters	2,500.00	2,499.92	.08	.08
Contingent	41,800.00	37,402.41	4,397.59	859.00
Navigation and navigation supplies	106,000.00	75,340.54	30,659.46	5,927.15
Civil establishment, Navigation	9,000.00	8,757.49	242.51	287.32
Contingent, Navigation	5,000.00	3,844.90	1,155.10	315.91
Ordnance and Ordnance Stores	141,000.00	130,082.01	10,917.99	8,794.18
Ordnance:				
Repairs	15,000.00	8,944.77	6,055.23	3,057.00
Civil establishment	24,525.00	20,998.66	3,526.34	3,526.34
Contingent	8,000.00	5,807.73	2,192.27	.66
Torpedo Corps and War College	75,000.00	53,806.15	21,193.85	8,470.57
Equipment of Vessels	675,000.00	354,920.64	320,079.36	112,949.06
Equipment of Vessels (deficiency, appropriated by act September 30, 1890)	100,000.00	....	....	....
Transportation and Recruiting, Equipment and Recruiting	30,000.00	29,494.66	505.34	2,645.25
Transportation and Recruiting, Equipment and Recruiting (deficiency, appropriated by act September 30, 1890)	1,652.83	....	....	....
Civil establishment, Equipment and Recruiting	11,525.00	11,524.87	.13	.23
Contingent, Equipment and Recruiting	15,000.00	9,594.67	5,405.33	2,841.93
Naval Training Station, Coasters' Harbor Island, R. I	*20,000.00	15,726.26	4,273.74	2,579.01
Maintenance, Yards and Docks	165,000.00	143,113.86	21,886.14	8,189.01
Civil establishment, Yards and Docks	46,754.60	46,536.79	217.81	290.35
Contingent, Yards and Docks	20,000.00	9,449.26	10,550.74	10,426.12
Repairs and Preservation at Navy-Yards	225,000.00	203,347.47	21,652.53	7,273.68
Naval Home, Philadelphia, Pa	68,517.00	57,440.91	11,076.09	698.44
Medical Department	57,500.00	53,577.40	3,922.60	2,667.62
Naval Hospital Fund	20,000.00	20,000.00	....	....
Repairs, Medicine and Surgery	20,000.00	19,258.15	741.85	409.89
Contingent, Medicine and Surgery	25,000.00	20,370.14	4,629.86	632.98
Provisions, Navy	1,055,000.00	925,573.39	129,426.61	2,493.02
Civil establishment, Provisions and Clothing	66,510.03	66,073.98	436.05	528.58
Contingent, Provisions and Clothing	40,000.00	28,580.03	11,419.97	6,862.49
Construction and Repair	†900,000.00	774,087.57	125,912.43	39,047.18
Civil establishment, Construction and Repair	19,972.50	19,737.82	234.68	234.73
Steam-Machinery	605,000.00	517,648.46	87,351.54	25,075.81
Civil establishment, Steam-Engineering	17,000.00	16,728.58	271.42	271.42
Contingent, Steam-Engineering	1,000.00	686.34	313.66	46.11
Total	13,189,044.03	11,011,288.95	2,058,304.23	1,197,496.49

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* Including $6,000 for deficiency appropriated by act April 4, 1890.

† Including $50,000 for deficiency appropriated by act April 4, 1890.

As will be seen from the foregoing exhibit—

The amount of appropriations for the current expenses of the fiscal year 1890, including $6,000 for Naval Training Station, Coaster's Harbor Island, Rhode Island, and $50,000, Construction and Repair, appropriated by act of April 4, 1890 was June 30, 1890		$13,069,593.18
Appropriated by act of September 30, 1890		119,450.85
		13,189,044.03
Amount of appropriations June 30, 1890		13,069,593.18
Drawn by requisition to June 30, 1890		11,011,288.95
Balance undrawn July 1, 1890		2,058,304.23
Appropriated by act of September 30, 1890		119,450.85
		2,177,755.08
Drawn by requisition from July 1, to October 31, 1890		980,258.59
Balance undrawn November 1, 1890		1,197,496.49
In hands of pay officers November 1, 1890		9,929.23
		1,207,425.72
Due from pay of the Navy to officers and men	$714,921.93	
Due from pay of the Marine Corps to officers and men	46,596.02	
Due from equipment of vessels	50,000.00	
Due from construction and repair	30,000.00	
Due from steam machinery	20,000.00	
Due from other appropriations	42,205.77	
Due to clothing, Navy	109,710.69	
Due to small-stores fund	31,737.23	
		1,045,171.64
Available balance		152,254.08

SALES OF GOVERNMENT PROPERTY, AND MISCELLANEOUS RECEIPTS.

A statement, prepared in the office of the Fourth Auditor of the Treasury, will be found in the appendix, which shows in detail the receipts, from November 1, 1889, to November 1, 1890, from sales of condemned property belonging to the Navy and the Marine Corps, from sales of supplies and materials to other departments of the Government and to persons in the service, from rents of wharves and grounds, and as interest and gains on exchange. The total amount so received was $85,691.02, of which $47,083.54 reverted to the appropriations from which the supplies and material were drawn, and $38,607.48 were covered into the Treasury as "miscellaneous receipts," in accordance with law.

In addition to those mentioned in the last annual report of this Department, the following vessels have been surveyed and condemned as unfit for further use in the Navy, and in pursuance of the act of August 5, 1882, their names have been stricken from the Navy Register: The *Brooklyn*, at Norfolk, and the *Saugus* and *Rescue*, at Washington. It is proposed at an early day to offer for sale such vessels as have been stricken from the Navy Register as it may be deemed advisable to dispose of in that way.

DRY-DOCK COMMISSIONS.

In the annual report of last year the Department dwelt upon the extreme necessity of a navy-yard or dry-dock on the northwest coast, and also upon the Gulf. This necessity remains as great as ever. The naval appropriation act approved June 30, 1890, required the President to appoint a commission composed of two competent naval officers, one competent army officer, and two competent persons from civil life, whose duty it should be to select a suitable site, having due regard to commercial and naval interests, for a dry-dock at some point on the shores of the Pacific Ocean, or the waters connected therewith, north of the parallel of latitude marking the northern boundary of California, including the waters of Puget Sound, and also Lakes Union and Washington, in the State of Washington. An executive order of September 6, 1890, designated, in pursuance of this law, the following named persons as members of the commission: Capt. T. O. Selfridge, U. S. Navy, president; Col. George H. Mendell, U. S. Army; Hon. T. C. Platt, of New York; Hon. Richard W. Thompson, of Indiana; and Lieut. A. B. Wyckoff, U. S. Navy. The commission met at Tacoma, Wash., October 1. It is understood to have completed its examination, but has not yet handed in a report.

By the same act the President was required to appoint a commission, to be similarly constituted, to select a suitable site, having due regard to commercial and naval interests, for a dry-dock at some point on the shores of the Gulf of Mexico or the waters connected therewith. In the case of both commissions, the act provides that if private lands are selected for a site, the commission is to estimate its value and ascertain as nearly as practicable the cost for which it could be purchased or acquired, and make full and detailed report to the President for transmission with his recommendation to Congress.

An executive order of November 22 designated the following named persons as members of the Gulf Commission: Capt. F. M. Bunce, U. S. Navy, president; Col. C. B. Comstock, Corps of Engineers, U. S. Army; Hon. Sidney Perham, of Maine; Hon. David T. Littler, of Illinois; and Lieut. R. M. G. Brown, U. S. Navy.

The commission will be organized without delay and proceed to carry out the work prescribed by the statute.

REVENUE MARINE SERVICE.

The Department renews its recommendation, made last year, that an act be passed consolidating the Revenue Marine Service with the Navy. The advantages of this change to both branches of the service have been repeatedly pointed out, and it is not necessary to dwell upon it again. No substantial objection has been advanced which counterbalances the great advantages to be derived from the measure. The act now before Congress, which has passed the House, has been carefully drawn, and the Department earnestly recommends its passage.

INCREASE OF THE NAVY.

The aim of the Navy Department during the last year in carrying out the provisions of law in reference to the increase of the Navy requires little description further than that which has been already given. It is the aim that was adopted and steadily pursued during the early years of our naval history; to build ships of various types for various purposes, each one of which should be the best of her type in existence. The objects to be attained in the battle ships, in the *New York*, in No. 6, in No. 12, and in the torpedo cruiser, are distinct and well defined, and it is believed that, taken as a whole, they point out, with a clearness that can not be mistaken, the true policy of naval construction which this country should adopt to meet the demands that exist to-day. It is safe to say that, in the present state of information on this subject, no mistake can be made in duplicating one of these types.

In the sea-going coast-line battle ships, the United States possesses three vessels, which, though few in number and of less displacement than the monsters now building in Europe, are as powerful as any battle ships in the world. In my report of last year I stated that, in my opinion, twenty ships of this class were required adequately to protect the two coasts of the United States. Such, however, is the great power, both offensive and defensive, of the design evolved during the past year that the Department may safely modify its previous figure. There is no doubt that twelve such battle ships as are now in course of construction would equal in efficiency for our purposes the twenty that were then contemplated, and with a suitable proportion of harbor-defence ships, cruisers, and gun boats, would put the coasts of the United States in a position where they might be free from all anxiety as to the consequences of attack from abroad.

In building any new armored ships that may now be authorized, whether battle ships or harbor defenders, the Department will be free from all those apprehensions as to the failure of the armor supply from which it has hitherto suffered. Not only will the mills whose plant is now approaching completion be able to meet the wants of ships hereafter projected by the time the latter need their armor, but if such ships were now authorized the manufacturers would be justified in increasing their plant to such an extent as to advance the rate of production already contracted for. The demand would bring about a supply, as has already been the case with the three battle ships and as would have been the case to a still larger extent if the number of battle ships authorized last summer had been greater.

It appears, therefore, that the building of battle ships will not be obstructed by the want of armor. As far as other material and the necessary work thereon are concerned, including design and construction both of ships and of engines, the Department was never more favorably situated for carrying on operations than at the present time.

Whatever line of construction Congress should now deem it best to follow up, the Department would draw especial attention to the necessities of the most vulnerable points along the coast, with a view of providing, as far as possible, for the protection of the enormous interests at stake in those localities. The stretch of coast from Fortress Monroe to Boston contains four large cities, one of them a vast aggregation of cities, the storehouses of national wealth, which to-day is entirely accessible to an enemy. The defense of these four commercial seaports is a problem of vital interest to the whole United States. The States of Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and Virginia are perhaps nearest to the danger, but a danger that threatens the coast and seaports of these States is a danger to the whole country. Any measure upon which these localities unite Congress could not fail to adopt.

There is no other instance in the world at the present time of so much wealth in so exposed a situation. To protect it requires a combination of guns afloat and guns on land. Especially at that angle made by the shores of New England and New Jersey, the junction of internal and external lines of communication, where so much of the world's commerce centers, should every reasonable precaution be taken to prevent the entrance of a hostile force. The peculiar configuration of Long Island Sound, with the harbors and bays affording shelter in its neighborhood, the whole forming a highly advantageous base of operations for a maritime assailant, is such that no enemy's fleet should ever be allowed to gain an entrance therein.

The harbor of New York at the present time is entirely defenseless. The forts at the Narrows would offer no obstruction to the entrance of a fleet. Any vessel, whatever her size or character, armed with the modern 8-inch guns—which, be it remembered, are far from being the heaviest guns afloat—could lie out of range of the forts and destroy them. As for Long Island Sound, it has no forts worthy of the name, and the entrance to the East River by that route is as unobstructed as the Narrows. It may be said that guns could be mounted on shore to fire at such a fleet. The Army possesses no modern guns for the purpose, and the cast-iron shell from the guns now in its possession would make no more impression on modern ironclads than hail-stones on a roof. It is likewise thought by those who are ignorant of the actual conditions that torpedoes would prevent the entrance of the fleet. The fact is, we have no torpedoes. Stationary torpedoes or mines, indeed, we have, or could make and lay in abundance, but an attacking fleet could pick them up or countermine without danger to itself, leaving a clear path for its ships. Of automobile torpedoes, which, though not a principal means of defense, would yet be a contributing factor, we have not one at the present time. As for our unprotected cruisers, if they staid in port, it would only be to become involved in a general capitulation. There is nothing, therefore, to prevent the access of a fleet to New York by either the eastern or the southern entrance.

With a fleet once in the harbor the consequences would be of such magnitude that the country at large could not disregard them. The popular impression is that the danger of a sea-coast city is a danger of bombardment, with ransom as an alternative. It is not regarded as a pressing danger, being opposed to the civilized tendencies of the age, and, at the worst, a menace that can be bought off. Leaving out, however, the possibility, if such a possibility exists, that a state at war will forego an overwhelming strategic advantage out of deference to the "civilized tendencies of the age," and that any State or city is rich enough to pay the fifty or one hundred millions that may be exacted as the price of immunity, the danger does not stop here. The terms of ransom would undoubtedly include the surrender of all the shipping, naval or mercantile, in the port. In the case of New York, it is hard to say what limit would be fixed to a ransom, and Brooklyn and Jersey City would contribute their shares.

But the calamity would not end with the payment of money and the surrender of ships. An enemy's fleet once in the waters of New York would remain there. Commerce would be annihilated. Communication would be absolutely cut off. The ferryboats would cease to run. The Brooklyn Bridge would be closed to traffic as the condition of its preservation. Finally, the railroad communications would be cut and the food supply of two and one-half millions of people would come to an end. Capitalists might afford to pay a ransom, but famine would fall first on the homes of the poor. The ransom paid by that population would be anything which it was in their power to give, and which the fleet in the harbor would accept as the price for its departure.

If any one fancies that this is an overdrawn picture, let him make a simple calculation of the amount of food daily required by two and one-half millions of people. Taking the Navy ration, a fair allowance of the food that will support an adult man during twenty-four hours, and making a proper deduction for women and children, it appears that there is consumed daily in New York and Brooklyn:

	Pounds.
Bread	1,575,000
Vegetables	1,575,000
Meat	1,350,000
Butter	225,000
Coffee	225,000
Sugar	450,000

This amount or its equivalent must as an average be received daily in the two cities from outside. Whatever the quantity on hand for consumption, or stored for exportation, it would soon be exhausted by such a drain when additions to the stock had ceased; and it must be remembered that all the elevators and many of the store houses containing the supply are on the water front, and not a few of them on the wrong side of the river. Those who recall the scarcity caused by the snow blockade in the great storm of March, 1887, may form some idea of the effect of absolute stoppage of communication. Starvation would be only a question of days.

The present statement is revealing no secret; at least no secret to foreign States. It is only our own people who ignore it. The facts are patent upon the charts of our own Coast Survey—charts upon which every channel on the water and every topographical detail on the land are plotted with fatal accuracy—and which any one, American or foreigner, has for years been able to have for the asking.

No land force, however numerous or resolute, could prevent the result I have described. Our present naval force would be equally powerless. Even when all the ships now authorized are completed we should not have a fighting chance against a respectable fleet of foreign ironclads. There are other seaboards besides the Atlantic exposed to attack, other cities besides New York of commercial importance—New Orleans on the Gulf, San Francisco and Tacoma and Seattle on the Pacific. Our line of defense is long, and its parts are so divided and so remote that they could not be included in any single plan of concerted operations. Each would inevitably become the object of separate attack, and each must be effectively and separately guarded. Nothing short of a force of battle ships, numerous enough to be distributed in the separate fields of attack and able to concentrate on any threatened point within their own field, will prove a complete protection.

In my previous report, in addition to the battle-ships, I suggested a force of powerful harbor-defense vessels for the specific protection of these exposed localities. Congress, as it seems to me, with great judgment, applied its important increase of last year to the most pressing necessity—that of battle-ships, and the Department endeavored, to the best of its ability, to meet the call that was made upon it with promptness and in accordance with the demands of existing naval warfare. Both battle-ships and harbor-defenders are still far too few in number to meet the urgent necessities of the situation.

The type of ship which the Department would suggest for purely local purposes is an enlarged *Puritan*, of light draught, not more than 14 to 16 feet, of moderate speed, and intended absolutely for smooth-water cruising, but with such armor and armament as to make it, at the same time, irresistible and invulnerable against any single assailant. Twenty inches of armor and eight 13-inch guns would fulfill the prescribed conditions. It is a serious question, however, whether greater advantages would not be gained by distributing the guns in two vessels instead of one; but whichever plan is adopted, the general conditions of the problem remain the same. The ships would be intended exclusively for local purposes, and would have a post and a station from which they would never be absent. While the battle-ships are of the first importance to concentrate along the coast, or in waters not far removed from it, wherever they may be needed, the continuous presence of a sufficient number of harbor-defense vessels would stay the entrance of an enemy until the battle ships could arrive. The type of harbor-defense ship described is less expensive than the sea-going ships, and it answers, as no other type can answer, the requirements of American harbors.

Should such a line of construction be adopted, the vessels so built should be regarded as distinctively for local protection. The movement towards the creation of a naval militia, which has found expression in the legislation of four States—Massachusetts, Rhode Island, New York, and Pennsylvania—would receive additional strength and encouragement from the creation of this national force reserved for local purposes. The harbor-defense ship would become the rallying point, the armory, the drill-hall, the parade ground, and the naval school of those young men who have shown such spirit and earnestness in the organization of the naval militia. It should be their privilege to become the principal source of supply for the complement, both of officers and men, of their local ship; and the result would be an addition of incalculable strength to the naval resources of the country.

If such a plan should be adopted it is reasonable to believe that Boston, New York, Philadelphia, Baltimore, New Orleans, San Francisco, and the cities on Puget Sound would become centers of naval strength instead of being, as they are to-day, conspicuous examples of maritime weakness, and inviting objects of maritime attack; while these local forces, organized in complete harmony with the spirit of American institutions, would be welded together and transfused with the spirit of naval discipline by the small but efficient standing force which the country will always maintain.

In conclusion I would repeat here the proposition that was laid down at the opening of my report last year, that "the purpose for which the United States maintains a Navy is not conquest, but defense." The best guaranty of peace is a judicious expenditure for the Navy, such as will meet the necessities of the country. At the present time it has not such a force, nor will it have the force required even when all the ships now authorized are completed. The problem of naval construction has been simplified almost beyond belief in the last eight years. It only remains to add to the number of vessels of types already in existence.

The price is not too high to pay if it affords the means whereby the United States, for the first time in many years, may be enabled to preserve and defend its rights. War is a great calamity, but it is not the greatest calamity that can befall a free, intelligent, and self-respecting people.

B. F. TRACY,
Secretary of the Navy.

APPENDIX.—ESTIMATES, CONTRACTS, ETC., SECRETARY'S OFFICE.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
SALARIES, OFFICE OF THE SECRETARY OF THE NAVY.			
Secretary (July 11, 1890)		$8,000.00	
Assistant Secretary (same act)		4,500.00	
Chief clerk (same act)		2,500.00	
Clerk to Secretary (same act)		2,250.00	
Disbursing clerk (same act)		2,250.00	
Two clerks of class four (same act)		3,600.00	
One clerk of class four, in charge of files and records (August 5, 1882; July 11, 1890)		1,800.00	
One clerk of class three (July 11, 1890)		1,600.00	
One stenographer (same act)		1,600.00	
One clerk of class two (same act)		1,400.00	
Four clerks of class one (same act)		4,800.00	
One clerk at $1,000 (same act)		1,000.00	
One telegraph operator* (increase of $200 submitted) (same act)		1,200.00	
One carpenter† (increase of $100 submitted) (same act)		1,000.00	
Two messengers, at $840 each (same act)		1,680.00	
Three assistant messengers, at $720 each (same act)		2,160.00	
Two messenger boys, at $420 each (same act)		840.00	
One messenger boy, at $360 (same act)		360.00	
One laborer (same act)		660.00	
One clerk of class two for Inspection Board (same act)		1,400.00	
One laborer for Inspection Board (same act)		660.00	
One clerk of class one for Examining and Retiring Board (same act)		1,200.00	
		46,460.00	$46,160.00
SALARIES, OFFICE OF THE JUDGE-ADVOCATE-GENERAL.			
Chief clerk (in lieu of one clerk of class four) (same act)	$1,800.00		
One clerk of class four (same act)	1,800.00		
Two clerks of class three (increase of one submitted) (same act)	3,200.00		
One clerk of class two (same act)	1,400.00		
Two clerks of class one (same act)	2,400.00		
One clerk (same act)	1,000.00		
One laborer (same act)	660.00		
		12,260.00	10,660.00
SALARIES, OFFICE OF NAVAL INTELLIGENCE.			
One stenographer (submitted)	1,600.00		
One clerk of class two (submitted)	1,400.00		
One clerk of class one (submitted)	1,200.00		
One laborer (submitted)	660.00		
The work of the Office of Naval Intelligence is constantly increasing; with the increase in construction and the growing work of arming and equipping the new ships, the importance of this office is felt by every bureau and officer of the Department and in the service at large. With this steady increase of work the office labors under the enormous disadvantage of having no clerical force authorized, although prior to the current fiscal year one stenographer had been allowed by the appropriation bill. The estimate herewith submitted is the least that could do properly the clerical work of the office. At present the office has but one clerk, borrowed from another bureau.			
LIBRARY OF THE NAVY DEPARTMENT.			
One clerk at $1,000 (July 11, 1890)	1,000.00		
One assistant messenger at $720 (same act)	720.00		
One laborer at $660 (same act)	660.00	2,380.00	2,380.00
Professional books and periodicals (same act)	1,000.00	....	1,000.00
OFFICE OF THE NAVAL RECORDS OF THE REBELLION.			
Two clerks of class four (July 11, 1890)	3,600.00		
One clerk of class three (same act)	1,600.00		
Two clerks of class two (same act)	2,800.00		
Two clerks of class one (same act)	2,400.00		
One clerk at $1,000 (same act)	1,000.00		
Two copyists at $900 each (same act)	1,800.00		
Four copyists at $720 each (same act)	2,800.00		
For necessary traveling expenses for collection of records (same act)	600.00		
		16,680.00	16,680.00

* This rate of pay is made in order to assimilate the rate of pay of telegraph operator with that of other Departments. † This rate of pay is made in order to assimilate the rate of pay of carpenter with that of other Departments.

Estimates of appropriations required for the service of the fiscal year, etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation	Amount appropriated for the current fiscal year ending June 30, 1891.
PAY OF THE NAVY.			
Pay of officers on sea duty; officers on shore and other duty; officers on waiting orders; officers on the retired list; admiral's secretary; clerks to commandants of yards and stations; clerks to paymasters at yards and stations; general storekeepers; receiving ships and other vessels; extra pay to men reënlisting under honorable discharge; pay of petty officers, seamen, landsmen, and boys, including men in the engineers' force, and for the Coast-Survey Service and Fish Commission, seven thousand five hundred men and seven hundred and fifty boys, at the pay prescribed by law. R. S., p. 246, sec. 1367; p. 248, secs. 1386–1388; p. 265, sec, 1556; p. 269, sec. 1569; p. 269, sec. 1573; p. 272, sec. 1595; May 12, 1879, vol. 21, p. 3, sec. 1; Aug. 5, 1882, vol. 22, pp. 285–287, sec. 1; Mar. 3, 1883, vol. 22, pp. 472, 473, sec. 1; Mar. 3, 1885, vol. 23, p. 340, sec. 1; Mar. 2, 1889, vol. 25, p. 809, sec. 1; June 30, 1890, vol. 26, p. 189, sec. 1 ..	....	$7,314,742.00	$7,250,000.00
NOTE.—The foregoing estimate is made up as follows:			
Pay of 1,504 officers on the active list......... $3,440,150			
Pay of 283 naval cadets under instruction.... 141,500			
Pay of 368 officers on the retired list.......... 818,103			
Pay of 1 secretary and 92 clerks............... 118,800			
Pay of petty officers, seamen, landsmen, and boys....................................... 2,645,000			
Extra pay of petty officers and seamen reënlisting under honorable discharge........... 141,189			
To pay interest on deposits by men, act February 9, 1889.................................. 10,000			
Total................................. 7,314,742			
PAY MISCELLANEOUS.			
For commissions and interest; transportation of funds; exchange; mileage to officers while traveling under orders in the United States, and for actual personal expenses of officers while traveling abroad under orders, and for traveling expenses of apothecaries, yeoman, and civilian employés, and for actual and necessary traveling expenses of naval cadets while proceeding from their homes to the Naval Academy for examination and appointment as cadets; for rent and furniture of buildings and offices not in navy yards; expenses of courts-martial, prisoners and prisons and courts of inquiry, boards of investigation, examining boards, with clerks' and witnesses' fees, and traveling expenses and costs; stationery and recording; expenses of purchasing-paymasters' offices of the various cities, including clerks, furniture, fuel, stationery, and incidental expenses; newspapers and advertising; foreign postage; telegraphing, foreign and domestic; telephones; copying; care of library, including purchase of books, prints, manuscripts, and periodicals, ferriage, tolls, and express fees; costs of suits; commissions, warrants, diplomas, and discharges; relief of vessels in distress; canal tolls and pilotage; recovery of valuables from shipwrecks; quarantine expenses; reports, professional investigation; cost of special instruction, at home or abroad, in maintenance of students and attachés and information from abroad, and the collection and classification thereof, and other necessary incidental expenses (June 30, 1890)	....	240,000.00	240,000.00
CONTINGENT NAVY.			
For all emergencies and extraordinary expenses arising at home or abroad, but impossible to be anticipated or classified, exclusive of personal services in the Navy Department or any of its subordinate bureaus or offices at Washington, District of Columbia....................	....	7,000.00	7,000.00
CONTINGENT EXPENSES, NAVY DEPARTMENT.			
Stationery, furniture, newspapers, plans, drawings, drawing materials, horses and wagons, freight, expressage, postage, and other absolutely necessary expenses of the Navy Department and its various bureaus and offices (July 11, 1890)	....	15,000.00	15,000.00
PRINTING AND BINDING.			
Printing and binding for the Navy Department, including $28,000 for the Hydrographic Office, to be executed under the direction of the Public Printer (August 30, 1890)......	....	90,000.00	70,000.00

Schedule of bids and statement of contracts awarded and entered into to furnish stationery for the Secretary's office and Bureaus of the Navy Department for the fiscal year ending June 30, 1891.

Name and address of bidder.	Class 1.	Class 2.	Class 3.	Class 4.	Class 5.	Class 6.	Class 7.	Class 8.
1. P. P. Kellogg & Co., Springfield, Mass	$1,356.54	....	....	....	....	....	....	....
2. Easton & Rupp, Washington, D. C	....	$1,595.26	....	....	46.87	41.76	....	88.42
3. Remaburg & Elliott, Washington, D. C	....	....	....	....	....	....	....	....
4. William Ballantyne & Son, Washington, D. C	....	....	....	*277.05	....	*27.13	*190.63	*56.88
5. Wyckoff, Seamans & Benedict, Washington, D. C	....	....	*1,152.26	....	....	....	....	....
6. William H. Teepe, Washington, D. C	....	....	1,181.48½	280.73⅓	*42.27½	40.55	199.92⅓	69.38
7. E. J. Brooks & Co., New York, N. Y	....	....	....	....	....	....	....	†146.53 †163.55
8. Tissot & Schultz, New York, N. Y	2,209.16	1,315.53	1,233.44	294.45	62.63	....	....	....
9. Rowland A. Robbins, New York, N. Y	1,485.88	*1,177.62	1,250.60	284.09	46.64	37.14	194.00	73.04
10. The Mineralized Rubber Company, New York, N. Y	....	....	....	....	....	....	....	....
11. Woodward & Lothrop, Washington, D. C	....	....	....	280.36	44.83	28.56	192.58	57.14
12. James J. Chapman, Washington, D. C	*1,188.12	....	....	....	....	....	....	....

Name and address of bidder.	Class 9.	Class 10.	Class 11.	Class 12.	Class 13.	Class 14.	Class 15.	Class 16.
1. P. P. Kellogg & Co., Springfield, Mass	....	....	....	....	....	....	....	....
2. Easton & Rupp, Washington, D. C	....	259.28	....	....	....	....	190.79	....
3. Remsburg & Elliott, Washington, D. C	....	....	....	....	....	....	....	*450.96
4. William Ballantyne & Son, Washington, D. C	*165.60	219.51	....	....	....	....	....	....
5. Wyckoff, Seamans & Benedict, Washington, D. C	....	....	....	....	....	....	....	....
6. William A. Teepe, Washington, D. C	201.48	311.61⅓	391.38	521.24⅓	200.56	*75.50⅓	*150.35⅝	....
7. E. J. Brooks & Co., New York, N. Y	....	....	....	....	....	†87.00 †60.97	....	....
8. Tissot & Schultz, New York, N. Y	....	....	....	....	....	....	....	....
9. Rowland A. Robbins, New York, N. Y	190.44	255.32	344.48	*490.86	124.30	66.88 93.12	168.26	516.72
10. The Mineralized Rubber Company, New York, N. Y	....	†247.58	....	....	....	....	....	....
11. Woodward & Lothrop, Washington, D. C	....	*218.22	*282.42	....	*122.98	86.54	217.66	511.60
12. James J. Chapman, Washington, D. C	....	....	....	....	....	....	....	523.05

* Awarded. † Informal.

Schedule of bids and statement of contracts awarded and entered into to wash towels and furnish ice for the Navy Department during the fiscal year ending June 30, 1891.

TOWELS.

Bidder.	Date of advertisement.	Amount of bid.	Date of contract.
		Per 100.	
1. Alice Simmons*	May 16, 1890	$0.60	June 25, 1890.
2. M. A. Weaver	May 16, 1890	.75	
3. Meta Steffen	May 16, 1890	.95	
4. Gennie M. Frazer†	May 16, 1890	‡5.00	
5. Mary Howard†	May 16, 1890	2.50	

*Awarded. † Informal. ‡ And find soap.

Schedule of bids and statement of contracts awarded and entered into to wash towels and furnish ice for the Navy Department, etc.—Continued.

ICE.

Bidder.	Date of advertisement.	Amount of bid.	Date of contract.
1. The Hygienic Ice Company	May 15, 1890	†34½	
2. The Great Falls Ice Company	May 15, 1890	†35	
3. The Independent Ice Company*	May 15, 1890	†27½	July 2, 1890.

*Awarded. † Per 100 pounds.

TABULAR STATEMENT OF PROPOSALS RECEIVED AND OPENED IN THE OFFICE OF THE SECRETARY OF THE NAVY BETWEEN DECEMBER 1, 1889, AND DECEMBER 1, 1890.

[An * marks each successful bid.]

Proposal received for steel, about 611 *tons of protective deck plates, required for use in the construction of the United States armored battle ship Texas, under the Department's advertisement of November* 16, 1889.

*Linden Steel Company	$102,164.16

Schedule of proposals for materials required for use in the construction at the navy yard, Brooklyn, N. Y., of the machinery for two cruisers of about 3,000 *tons displacement each.*

Class 10. Wrought-iron bolts and nuts:	
*J. B. Morrell & Co	$561.75
Greenlie, Wyatt & Co	975.00
Class 20. Anthracite coal and oven or kiln coke:	
David Duncan & Son	1,505.00
Class 42. Soft Virginia pig-iron, "Princess:"	
*D. S. Cook	2,050.00
Class 44-A. Steel plates for boiler-shells:	
Rectangular plates, nearest in size to the required dimensions.	
*Linden Steel Company	30,912.00
Carnegie, Phipps & Co	31,920.00
Class 44-B. Fire-box steel and flange plates:	
Plates trimmed to shape and flanged:	
Richmond Locomotive and Machine Works	81,200.00
Plates trimmed to the nearest rectangle or circle:	
*Linden Steel Company	20,860.00
Carnegie, Phipps & Co	22,400.00
Class 44-C. Steel rods, shapes, and forgings for boiler bracing:	
Forgings for braces and stays:	
Linden Steel Company	9,632.00
Carnegie, Phipps & Co	8,512.00
*Greenlie, Wyatt & Co	5,264.00
Midvale Steel Company	10,304.00
Stay bolt blanks:	
Linden Steel Company	4,816.00
Carnegie, Phipps & Co	4,256.00
*Greenlie, Wyatt & Co	4,928.00
Midvale Steel Co	4,704.00
T's and angles:	
Carnegie, Phipps & Co	1,568.00
*Greenlie, Wyatt & Co	1,120.00
Midvale Steel Co	4,032.00
Class 49. Wrought-iron nut blanks:	
*Greenlie, Wyatt & Co	2,250.00
Class 56. Wrought-iron washers:	
Greenlie, Wyatt & Co	480.00

(The bid for Class 20 was rejected as excessive.)

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* Indicates successful bid.

Statement of proposals received and opened January 22, 1890, for the construction of two steel gunboats of about 1,000 tons in displacement and a steel practice vessel of about 800 tons in displacement, authorized by act of September 7, 1888.

For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy:

* Bath Iron Works, of Bath, Me., for the construction of two gunboats	$637,000.00
The Samuel L. Moore & Sons Co., of Elizabethport, N. J., for the construction of two gunboats	562,875.00
Bath Iron Works, of Bath, Me., for the construction of one gunboat	327,000.00
The Samuel L. Moore & Sons Co., of Elizabethport, N. J., for the construction of one gunboat	285,000.00
Atlantic Iron Works, of Boston, Mass., for the construction of one gunboat	4,000.00
The Samuel L. Moore & Sons Co., of Elizabethport, N. J., for the construction of two gunboats and practice vessel	562,875.00 245,325.00
The Samuel L. Moore & Sons Co., of Elizabethport, N. J., for the construction of one gunboat and practice vessel	285,000.00 245,325.00
The Samuel L. Moore & Sons Co., of Elizabethport, N. J., for the construction of practice vessel	245,325.00

For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the contractor:

Atlantic Iron Works, of Boston, Mass., for the construction of one gunboat	344,000,00

(No award was made for the practice vessel under the above proposals.)

Proposals for 16-inch gun lathes for the navy yard, Washington, D. C.

GROUP I.

Name of bidder.	For 1 lathe.	For 2 lathes.
William Sellers & Co	*a $75,950	a $141,900
William Sellers & Co	b 65,500	b 128,000
Bement, Miles & Co	a 65,100	a 127,200
Bement, Miles & Co	b 65,500	b 128,000
Bement, Miles & Co., and William Sellers & Co	a 66,500	a 130,000
The Niles Tool Works	b 62,270	b 120,800
The Pond Machine Tool Co	b 80,000	b 143,400

GROUP II.

Name of bidder.	For 1 lathe.	For 2 lathes.	For 3 lathes.
William Sellers & Co	a $56,550	a $103,100	a $148,650
William Sellers & Co	b 45,750	b 89,000	b 133,250
Bement, Miles & Co	a 45,350	a 88,200	a 132,050
Bement, Miles & Co	b 45,750	b 89,000	b 133,250
Bement, Miles & Co., and William Sellers & Co	a 45,750	a 89,000	a 133,250
The Niles Tool Works	b 45,970	b 89,140	b 132,210
The Pond Machine Tool Co	b 63,000	b 119,200	b 169,400

* Indicates successful bid. *a* Bidder's design. *b* Department's design.

(No award was made under Group II.)

Proposals for 16-*inch gun lathes for the navy yard, Washington, D. C.*—Continued.

GROUP III.

Name of bidder.	For 1 lathe.	For 2 lathes.	For 3 lathes.
William Sellers & Co	*a* $70, 700	*a* $131, 400	*a* $191, 100
William Sellers & Co	*b* 58, 250	*b* 114, 000	*b* 170, 250
Bement, Miles & Co	*a* 57, 850	*a* 113, 200	*a* 169, 050
Bement, Miles & Co	*b* 58, 250	*b* 114, 000	*b* 170, 250
Bement, Miles & Co., and William Sellers & Co	*a* 59, 250	*a* 116, 000	*a* 173, 750
The Niles Tool Works	*b* 53, 630	*b* 103, 770	*b* 153, 900
The Pond Machine Tool Co	*b* 72. 000	*b* 136, 000	*b* 194, 200

(No award was made under Group III.)

Proposals for 14-*inch gun lathes for the navy yard, Washington, D. C.*

GROUP I.

Name of bidder.	For 1 lathe.	For 2 lathes.
William Sellers & Co	*a* $60, 200	**a* $112, 400
William Sellers & Co	*b* 49, 800	*b* 97, 500
Bement, Miles & Co	*a* 49, 500	*a* 96, 900
Bement, Miles & Co	*b* 49, 800	*b* 97, 500
Bement, Miles & Co., and William Sellers & Co.	*a* 50, 600	*a* 99, 100
The Niles Tool Works	*b* 56, 020	*b* 108, 840
The Pond Machine Tool Co	*b* 78, 500	*b* 141, 150

GROUP II.

Name of bidder.	For 1 lathe.	For 2 lathes.	For 3 lathes.
William Sellers & Co.*	*a* $43, 970	*a* $79, 940	**a* $119, 910
William Sellers & Co.	*b* 37, 000	*b* 73, 000	*b* 107, 700
Bement, Miles & Co	*a* 36, 700	*a* 72, 400	*a* 106, 800
Bement, Miles & Co	*b* 37, 000	*b* 73, 000	*b* 107, 700
Bement, Miles & Co., and William Sellers & Co	*a* 37, 000	*a* 73, 000	*a* 107, 700
The Niles Tool Works	*b* 41, 840	*b* 80, 875	*b* 120, 310
The Pond Machine Tool Co	*b* 62, 000	*b* 117, 800	*b* 167, 700

GROUP III.

Name of bidder.	For 1 lathe.	For 2 lathes.	For 3 lathes.
William Sellers & Co*	*a* $58, 100	**a* $108, 200	*a* $162, 900
William Sellers & Co	*b* 46, 800	*b* 90, 620	*b* 135, 000
Bement, Miles & Co	*a* 46, 000	*a* 90, 020	*a* 134, 100
Bement, Miles & Co	*b* 46, 300	*b* 90, 620	*b* 135, 000
Bement, Miles & Co., and William Sellers & Co	*a* 47, 110	*a* 92, 220	*a* 138, 330
The Niles Tool Works	*b* 48, 060	*b* 93, 120	*b* 138, 180
The Pond Machine Tool Co	*b* 72, 000	*b* 136, 600	*b* 194, 200

Statement of proposals received and opened June 10, 1890, *for the construction of an armored cruiser of about* 8,100 *tons displacement* (*Armored Cruiser No.* 2), *authorized by act of September* 7, 1888.

Class 1. Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy:	
The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa	$3, 150, 000
Union Iron Works, of San Francisco, Cal	3, 100, 000
Risdon Iron and Locomotive Works, of San Francisco, Cal	3, 450, 000
Class 2. Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder:	
Union Iron Works, of San Francisco, Cal	3, 000, 000
* The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa	2, 985, 000

* Indicates successful bid. *a* Bidder's design. *b* Department's design.

Statement of proposals received and opened June 10, 1890, for the construction of a protected cruiser of about 5,500 tons displacement (Cruiser No. 6), authorized by act of September 7, 1888.

* Union Iron Works, of San Francisco, Cal., for the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy	$1,796,000
Union Iron Works, of San Francisco, Cal., for the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder	1,760,000

Statement of proposals received and opened June 10, 1890, for the construction of a steel practice vessel of about 800 tons displacement, authorized by act of September 7, 1888.

Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy:

F. W. Wheeler & Co., of Bay City, Mich	$245,000
* The Samuel L. Moore & Sons Company, of Elizabethport, N. J	250,000

Statement of proposals received and opened October 1, 1890, for the construction of three sea-going coast line battle ships of about 8,500 tons displacement each, authorized by act of June 30, 1890.

Class 1. For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy:	
Union Iron Works, of San Francisco, Cal. (for one vessel)	[a] $3,240,000
Risdon Iron and Locomotive Works, of San Francisco, Cal. (for one vessel)	3,275,000
The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa. (for one vessel)	2,990,000
Bath Iron Works, Limited, of Bath, Me. (for one vessel)	3,149,000
Union Iron Works, of San Francisco, Cal. (for two vessels)	6,400,000
The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa. (for two vessels)	5,780,000
The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa. (for the third vessel)	2,990,000
Class 2. For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder:	
The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa. (for one vessel)	3,120,000
* The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa. (for two vessels)	6,040,000
The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa. (for the third vessel)	3,120,000

Statement of proposals received and opened October 1, 1890, for the construction of one protected steel cruiser of about 7,350 tons displacement (cruiser No. 12), authorized by act of June 30, 1890.

Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy:

* The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa	$2,725,000
Union Iron Works, of San Francisco, Cal	3,025,000

(a) The contract for this vessel to be constructed in accordance with the Department's plans and specifications, but increased in length by 12 feet, was awarded to the Union Iron Works, of San Francisco, Cal., for the sum of $3,180,000, the act of June 30, 1890, which authorized the construction of three coast-line battle ships and one protected cruiser, requiring that one of the four vessels should, if it could be done at a fair cost, be constructed on or near the Pacific coast.

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* Indicates successful bid.

Statement of proposals received and opened October 6, 1890, *for the construction of three steam-tugs, authorized by act of March* 2, 1889.

Name of bidder.	One tug.	Two tugs.	Three tugs
Globe Iron Works Company			$103, 500
The Pusey & Jones Company	$45, 000	$88, 000	129, 000
John H. Dialogue Engineering and Ship-building Works			99, 900
James Clark & Co	34, 500	68, 500	
Neafie & Levy, Pen Works	33, 364		100, 000
The Samuel L. Moore & Sons' Company	34, 500	68, 250	102, 000
Harrison Loring*			*97, 314

* Indicates successful bid.

SALES OF GOVERNMENT PROPERTY.

Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1889, *to November* 1, 1890.

[Compiled in the Fourth Auditor's Office, by direction of the Secretary of the Treasury.]

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount credited to the appropriation.	Total amount deposited.	Remarks.
1889.							
Nov. 2	United States Treasury	G. A. Bartlet, disbursing clerk.	Salt-water soap furnished the *Blake*.		$23.25	$23.25	Bureau of Provisions and Clothing.
7	...do	J. Macmahon, paymaster	Gain on exchange	$41.80		41.80	
13	...do	H. B. Lowry, quartermaster, U. S. Marine Corps.	Condemned musical instruments.	50.00		50.00	
20	New York	George H. Read, paymaster	Rents and privileges at Wallabout.	1,094.75		1,094.75	Bureau of Yards and Docks.
21	United States Treasury	Secretary of the Navy	Proceeds sale of old vessels.	940.47		940.47	
11	New York	J. A. Mudd, assistant paymaster.	Proceeds sale running rigging.	100.74		100.74	Bureau of Equipment and Recruiting.
Dec. 6	United States Treasury	J. H. Chapman, assistant paymaster.	Gain on exchange	9.13		9.13	
6	...do	G. W. Simpson, assistant paymaster.	... do	51.47		51.47	
14	Norfolk, Va	C. W. Slamm, paymaster	Condemned stores	13,260.25	2,199.78	15,460.03	Bureau of Provisions and Clothing, $1,912.05. Bureau of Ordnance, $287.73. Bureau of Navigation, $209.94. Bureau of Equipment and Recruiting, $1,241.98. Bureau of Steam Engineering, $3,465.21. Bureau of Yards and Docks, $2,417.02. Bureau of Construction and Repair, $5,926.10.
23	United States Treasury	Seligman Brothers	Gain on exchange	1,801.09		1,801.09	
23	...do	Reah Frazer, passed assistant paymaster.	...do	.64		.64	
23	.. do	J. F. Tolfree, paymaster	...do	100.00		100.00	
1890.							
Jan. 8	First National Bank, Newport, R. I.	L. G. Boggs, paymaster	Provisions furnished officers' messes.		415.31	415.31	Bureau of Provisions and Clothing.
15	Philadelphia	H. M. Denniston, pay director.	Rent of wharf	41.67		41.67	Bureau of Yards and Docks.

Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1889, *to November* 1, 1890—Continued.

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount credited to the appropriation.	Total amount deposited.	Remarks.
1890. Jan. 18	United States Treasury	G. A. Bartlet, disbursing clerk	Hammocks furnished C.S.Str. *McArthur.*		$67.90	$67.90	Bureau of Equipment and Recruiting.
21	....do	H. B. Lowry, quartermaster, U. S. Marine Corps.	Proceeds of condemned clothing.	$228.06		228.06	
3	....do	....do	Proceeds of condemned stores.	46.94		46.94	
24	....do	....do	Proceeds of musical instruments.	15.00		15.00	
28	....do	John Corwine, passed assistant paymaster.	Proceeds of condemned provisions.	75.43		75.43	
29	....do	John W. Parsons, disbursing clerk.	Proceeds of coal furnished *Blake.*		230.83	230.83	Do.
Feb. 11	New York	M.C. McDonald, passed assistant paymaster.	Proceeds of condemned stores.	242.79	22.28	265.07	Bureau of Equipment and Recruiting, $201.65. Bureau of Steam Engineering, $16.88. Bureau of Construction and Repair, $6.35. Bureau of Navigation, $17.91. Bureau of Ordnance, $22.28.
14	United States Treasury	J. S. Phillips, assistant paymaster.	....do	157.48		157.48	Bureau of Steam Engineering, $113.39. Bureau of Equipment and Recruiting, $40.74. Bureau of Construction and Repair, $2.44. Bureau of Navigation, 91 cents.
21	Baltimore	T. T. Caswell, pay inspector	Proceeds sale surplus tar	42.00		42.00	Bureau of Yards and Docks.
Mar. 4	United States Treasury	H. B. Lowry, quartermaster, U. S. Marine Corps.	Proceeds sale condemned clothing.	73.37		73.37	
14	....do	R. P. Lisle, paymaster	Gain on exchange	5.96		5.96	
14	....do	Seligman Brothers	....do	4,414.30		4,414.30	
14	....do	B. H. McCalla, acting paymaster.	....do	17.36		17.36	
27	....do	M.C. McDonald, passed assistant paymaster.	Rent of lots, Yokohama	188.33		188.33	
28	Philadelphia	H. M. Denniston, pay director.	Proceeds condemned horse	82.40		82.40	Do.
Apr. 2	First National Bank, Newport, R. I.	L. G. Boggs, paymaster	Provisions furnished officers' messes.		423.76	423.76	Bureau of Provisions and Clothing.
4	United States Treasury	Jno. W. Parsons, disbursing clerk.	Articles of outfit furnished *Patterson.*		127.06	127.06	Bureau of Equipment and Recruiting.

Apr.	14	Philadelphia	H. M. Denniston, pay director	Rent of wharf	25.00		25.00	Bureau of Yards and Docks.
Jan.	15	New York	H. T. Stancliff, paymaster	Proceeds of condemned stores	29.36		29.36	Bureau of Ordnance, $4.40. Bureau of Navigation, $6.61. Bureau of Construction and Repair, 73 cents. Bureau of Equipment and Recruiting, $17.62.
Apr.	28	United States Treasury	H. B. Lowry, quartermaster, U. S. Marine Corps.	Fuel sold to officers		588.02	588.02	
May	9	...do	H. A. Gill, disbursing clerk	Stores furnished *Albatross*		159.50	159.50	Bureau of Equipment and Recruiting.
	13	...do	...do	...do		79.25	79.25	Bureau of Navigation.
	17	Philadelphia	H. M. Denniston, pay director	Rent of wharf	175.00		175.00	Bureau of Yards and Docks.
	22	New York	G. H. Griffing, paymaster	Proceeds condemned stores	2,450.00	17,864.71	20,314.71	Bureau of Provisions and Clothing.
	22	United States Treasury	Jno. W. Parsons, disbursing clerk.	Proceeds coal furnished *Bache*		599.46	599.46	Bureau of Equipment and Recruiting.
	28	Boston	C. W. Abbot, pay director	Material furnished Atlantic Works.		103.41	103.41	Bureau of Construction and Repair.
	31	United States Treasury	J. H. Stevenson, pay inspector	Clothing sold cadets		319.54	319.54	Bureau of Provisions and Clothing.
June	12	...do	Arthur Peterson, passed assistant paymaster.	Proceeds of equipment stores	153.18		153.18	Bureau of Equipment and Recruiting.
	18	New York	G. H. Griffing, paymaster	Rent of land to Brooklyn Gas Company.	125.00		125.00	Bureau of Yards and Docks.
	24	United States Treasury	James Hoy, pay inspector	Gain on exchange	193.16		193.16	
	23	National Bank of Commerce, New London.	R. T. M. Ball, assistant paymaster.	Proceeds sale of horse	44.00		44.00	Bureau of Yards and Docks.
	26	Boston	C. W. Abbot, pay director	Material furnished Atlantic Works.		10.40	10.40	Bureau of Construction and Repair.
	28	First National Bank, Newport, R. I.	L. G. Boggs, paymaster	Provisions furnished officers' messes.		279.90	279.90	Bureau of Provisions and Clothing.
July	3	New York	Jno. Furey, paymaster	Clothing furnished Revenue Marine steamer *Steward*.		36.50	36.50	Do.
	9	United States Treasury	Herbert A. Gill, disbursing clerk.	Sale of lamp to Fish Commission.		1.63	1.63	Bureau of Navigation.
	10	Norfolk, Va	C. W. Slamm, paymaster	Sale of condemned oxen	41.08		41.08	Bureau of Yards and Docks.
	17	United States Treasury	Stephen Rand, paymaster	Gain on exchange	22.71		22.71	
	17	...do	J. A. Mudd, assistant paymaster.	...do	6.09		6.09	
	17	...do	Seligman Brothers	...do	7,188.60		7,188.60	
	10	Norfolk, Va	C. W. Slamm, paymaster	Proceeds condemned stores	187.69	392.72	580.41	Bureau of Provisions and Clothing.
	29	United States Treasury	M. C. McDonald, passed assistant paymaster.	Gain on exchange	30.94		30.94	
	29	...do	G. W. Simpson, assistant paymaster.	...do	75.12		75.12	
	29	...do	J. C. Sullivan, passed assistant paymaster.	...do	33.51		33.51	
	30	New York	G. H. Griffing, paymaster	Rents and privileges at Wallabout.	1,255.99		1,255.99	Bureau of Yards and Docks.

Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1889, *to November* 1, 1890.—Continued.

Date of deposit	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount credited to the appropriation.	Total amount deposited.	Remarks.
1890. July 24	United States Treasury	H. B. Lowry, quartermaster, U. S. Marine Corps.	Sale of condemned horse	$2.18		$2.18	
Aug. 6	New York	G. H. Griffing, paymaster	Rents at Wallabout	142.83		142.83	
23	National Bank of Commerce, New London.	R. T. M. Ball, assistant paymaster.	Condemned stores and material.	81.77		81.77	Bureau of Yards and Docks, $47.56. Bureau of Steam Engineering, $12.60. Bureau of Construction and Repair, $16.43. Bureau of Equipment and Recruiting, $5.18.
26	United States Treasury	H. B. Lowry, quartermaster, U. S. Marine Corps.	Fuel sold to officers		$2,661.92	2,661.92	
Sept. 10	do	H. T. Stancliff, paymaster	Gain on exchange	93.99		93.99	
10	do	Seligman Brothers	do	2,255 04		2,255.04	
20	do	J. S. Phillips, assistant paymaster.	do	20.57		20.57	
20	do	E. N. Whitehouse, paymaster	do	210.73		210.73	
29	do	J. W. Parsons, disbursing clerk.	Coal furnished U. S. Coast and Geodetic Survey steamer *Endeavor*.		82.69	82.69	Bureau of Equipment and Recruiting.
Oct. 10	Boston	C. W. Abbot, pay director	Material furnished, and use of dock.	71.93	342.04	413.97	Bureau of Yards and Docks, $71.93. Bureau of Construction and Repair, $342.04.
6	United States Treasury	A. W. Bacon, paymaster	Proceeds sale condemned stores.	473.08	20,040.66	20,518.74	Bureau of Ordnance, $19,849.17. Bureau of Steam Engineering, $211.02. Bureau of Equipment and Recruiting, $257.46. Bureau of Provisions and Clothing, $196.09.
16	Philadelphia	H. M. Denniston, pay director	Rent of wharf	137.50		137.50	Bureau of Yards and Docks.
	Grand total			38,607.48	47,083.54	85,691.02	

REPORT

OF THE

CHIEF OF THE BUREAU OF YARDS AND DOCKS.

BUREAU OF YARDS AND DOCKS,
NAVY DEPARTMENT.
Washington, D. C., October 14, 1890

SIR: I have the honor to submit the following report of the operations of this Bureau for the fiscal year ending June 30, 1890, and also to submit estimates for the fiscal year ending June 30, 1892.

The tabulated statements at the end of this report show in detail the amount of expenditures during the last fiscal year, and the estimates for the next fiscal year, under the several heads of improvements, repairs and preservation, general maintenance, civil establishment, contingent, and support of the naval home.

The total estimates from the different navy-yards and stations are as follows:

Yard improvements	$3,369,356.05
Repairs and preservation	756,630.68
General maintenance	405,346.91
Civil establishment	83,364.49
Naval home	77,695.00
Total	4,692,393.13

The estimates of the Bureau have been largely reduced from those submitted by the several commandants, and are summarized in the following table:

Yard improvements	$1,161,718.68
Repairs and preservation	350,000.00
General maintenance	300,000.00
Contingent	40,000.00
Civil establishment	64,311.89
Naval home	78,295.00
Support of Bureau of Yards and Docks	12,430.00
Total	2,006,755.57

There are thirteen navy-yards and stations, exclusive of the naval home, covering 2,605 acres of ground, with 439 workshops, store and ship-houses, 7.18 miles of wharf-line, 10 dry-docks, 19 marine railways and launching ways, a large number of offices, many miles of railway, of water, gas, and steam-pipes, 150 horses and oxen, and 96 houses for officers' residences.

To keep all of these in repair and maintain the same there was appropriated, under the heads of Repairs and Preservation, $225,000; General Maintenance, $165,000; sums so entirely inadequate that it has been impossible to take proper care of the buildings and keep them in good repair.

For the year ending June 30, 1891, the appropriations under these heads are as follows:

Repairs and Preservation	$250,000
General Maintenance	230,000

And though larger than for the previous year are still insufficient for the purpose.

It must be borne in mind that though many of the navy-yards are closed, and thereby the expenses of the Navy in general much reduced, the Bureau of Yards and Docks is still charged with keeping them in repair.

The deterioration upon an unoccupied building or dock is as great, or greater, than when occupied. If these yards and stations are never to be used for naval purposes, true economy would be to sell them. If, however, the Government is to hold on to them for an emergency, sound policy requires they should be kept in repair. Another reason for increase of expense of this Bureau is that many improvements incidental to modern ships and a new navy have been made, such as the three new timber dry-docks at New York, Norfolk, and League Island; also the growing importance of Port Royal, Key West, and of New London for coaling stations. A dock is to be constructed at the former. These make it necessary to have increased appropriations.

During the past year two magnificent Simpson dry-docks have been opened for use, one at New York and the other at Norfolk navy-yards, while a third is expected to be opened at League Island in the course of a few months.

The dry-docks at the New York navy-yard are always occupied. Frequently ships have to wait a long time to get in, and another dock should be constructed there.

It has been the endeavor to keep the three principal dock yards, namely, New York, Norfolk, and Mare Island, in good working order.

One of the greatest needs for a modern navy is wharf room to facilitate fitting out ships. All of our yards lack this now.

The sums asked for under this heading at the various yards are of the utmost importance. A modern man-of-war is not only made longer than the old type, therefore requiring more room, but being machines require constant repair and overhauling, which can only be done properly and economically along side of a dock.

The dredging to keep the channels clear and of sufficient depth at the wharves, is a large drain upon the funds of the Bureau. At least $50,000 will be expended during the year for this purpose.

An electric plant has been installed at the Washington navy-yard for lighting the shops and streets. Steps are being taken to install plants at New York, Norfolk, and Mare Island navy-yards.

The Bureau has been studying the question whether it will not be possible to utilize the electric plant by day when not in use for lighting purposes to operate machinery, and it has come to the conclusion that it may be economical to do so if the tools are arranged for its use.

There are a number of wooden ship-houses at the Portsmouth, Boston, New York, and Washington navy-yards, in which were built wooden vessels. These houses are not suited to build modern vessels in, on account of the liability to fire and their darkness. One in New York has been taken down; it was in a bad condition, and a constant menace to the vessels building in its vicinity.

These houses might be suitable for protecting torpedo boats and small craft not in commission. If not, they should all be taken down, as the cost of painting and otherwise keeping them in repair is a large drain upon the resources of the Bureau.

The naval prison at Boston navy-yard is one of the store-houses altered for the purpose. It is too contracted, and should be replaced by a building built for the purpose. It is being improved in light and ventilation. That at Mare Island was built for the purpose, but is also too contracted. It is now being enlarged and improved.

As only those guilty of military offenses are confined in these places, it would seem as if they should be arranged so that more privileges and liberties could be granted to those who deserve it. There are no facilities for work of any kind, and very limited space for exercise.

NAVY-YARD, PORTSMOUTH, N. H.

Repairing dry-dock and pointing dry-dock basin	$10,000
Constructing reservoir and perfecting water system	22,287

So little has been expended upon this yard for the past few years that there are many repairs necessary to buildings, wharves, and streets. If the amount asked for under general maintenance and repairs and preservation is given, I think everything can be put in a fair condition. An item is asked for to complete the water supply. A recent fire at the yard destroyed two buildings, with their contents, and the erection of a hospital render this increased water supply absolutely necessary. The water is obtained from ponds on the island, and in order to have sufficient head it is proposed to build a service or distributing reservoir on the highest point.

NAVY-YARD BOSTON, MASS.

Rebuilding wharf No. 1	$15,776.80
Constructing steel shears	12,000.00
Extensions and renewal in water-pipe system	5,000.00

This yard is used principally for the manufacture of articles under the Bureau of Equipment. There is a fine dry-dock as well as facilities for all kinds of repair and building of men-of-war. The dock and wharves should be kept in readiness for use.

An item in the last appropriation bill will provide for the former.

An amount necessary to repair only one wharf is asked for this year, and the sum necessary for a derrick or shears to lift heavy weights, as there are none now.

There are several men-of-war building in Maine and in Boston, and it would seem natural and desirable that they be fitted out at this station. The small sums asked for will enable this to be done.

This yard has advantages for naval work which are not possessed by any yards except those of Washington and Norfolk, namely, water and rail communication with the whole country.

Basins could be readily constructed along side of the shops at a moderate cost, and should be if that yard is to be opened.

NAVAL STATION, NEW LONDON, CONN.

Water-supply system	$9,664.00
Converting drill-hall extension into lavatory and bath-rooms	2,166.50
Building for latrines	1,372.40
Partitions in store-house No. 1	1,233.00
Converting store-house No. 2 into mess hall and dormitory	1,768.00
Walks	1,530.00
Alterations in house "A"	950.00

This is most advantageously located for a coal and supply station. From a military point of view it would seem as if the location near the entrance to Long Island Sound in fresh water, with a natural basin which only requires deepening, was of the highest importance for the defense of New York, as well as a point from which to send a fleet to attack a blockading enemy.

A small sum is asked only for water supply, and to put the buildings in order.

In my opinion this should be made a coaling station with all modern appliances for handling coal. This would entail an expense of about $50,000.

NAVY-YARD, BROOKLYN, N. Y.

Three cranes	$15,000.00
Workshop for Bureau of Construction and Repair	112,611.16
Extension of building No. 28, boiler-shop for Bureau Steam Engineering	44,755.70
Extension of building No. 28, blacksmith and coppersmiths shops for Bureau Steam Engineering	35,039.20
Quay-wall on cob-dock	118,833.60
Quay-wall on Whitney basin	68,600.75
Quay-wall from northwest boundary to ship-house "D"	68,600.75
Paving and sewers around new dry-dock	21,835.00
Extension of building No. 28, erecting shop for Bureau Steam Engineering	69,549.43

At this yard more work is done for the Navy, more ships fitted out and repaired than at all the other yards combined. It requires more wharf-room, and the largest items are for wharf facilities and for workshops for the Bureau of Steam Engineering and Construction and Repair.

The items for wharves will finish the north front of the cob-dock and two sides of the Whitney Basin. The quay wall from northwest boundary to shiphouse "D" is necessary on account of the bad angle there, now formed by the wharf, which was built to extend the sewer. This angle makes it difficult for vessels to leave the wharf without having tugs to assist them, thus entailing expense and risk.

The items for quay-walls—wharves—are of great importance to the economical carrying on of work, and I respectfully urge that they be granted in their entirety.

A like sum will be necessary annually for the next three years to complete Whitney Basin and the remaining quay-wall.

The two dry-docks are in constant use; another is necessary and should be built without delay.

Several of the streets require paving. A new entrance should be made into the yard from the foot of Sands street. This latter improvement would give a more convenient way, as well as a better grade for hauling.

Should Congress grant the sums asked for under repairs and preservation, this street can be opened and paving done without a special appropriation.

NAVY-YARD, LEAGUE ISLAND, PENNSYLVANIA.

West dry-dock pier	$87,441.62
Cranes for Broad street wharf	25,000.00
Protection-wall, continuation of	61,750.00
Riprap for protection wall	9,150.00
Light retaining-wall, continuation of	25,000.00
Sewer and flushing tank	5,685.00
Artesian well, pump-house, and pumping plant	20,000.00
Three officers quarters and furniture	35,000.00
Railroad track	18,409.25
Widening causeway	13,813.01

The sums asked for for this navy-yard are to continue the improvements already begun in accordance with the report of the Board, submitted October 10, 1889.

The amounts asked for, together with that already spent, will give a wharf-room on the Delaware of about 1,200 feet, together with two piers, which will afford ample protection from floating ice.

The dry-dock, which will be opened by December next, is one of the finest in the country. This, together with the shops already built, will enable the Department to fit out any ships we have.

A large sum could be spent in carrying out the improvements recommended by the board.

The Bureau is of opinion that this navy-yard, so centrally located, with interior communication by rail and water and surrounded by fresh water, is destined to be the most important naval station.

The new navy will have to be laid up part of the year for economy's sake, and there is no other yard which possesses so great advantages as this for the purpose. The deterioration which will be prevented by the fresh water will alone compensate, in a short time, to pay for the outlay to build the basin and other improvements.

I append a copy of the report of the Board and earnestly recommend a liberal appropriation to build the basin and the canal approaches thereto recommended by the Board. The canal should be commenced at once and $300,000 appropriated

The city of Philadelphia has not extended its water system to the yard; therefore an artesian well is necessary to supply potable water.

If a railway is built through the yard no doubt connections will be made with the great railway systems, thus affording facilities for the employés to come to and fro, and for the cheap delivery of material.

NAVY-YARD, WASHINGTON, D. C.

Extension of railroad tracks	$3,567.50
Reconstruction store No. 10, for Bureau of Ordnance	30,499.10
Dry-air closets for Smith's quadrangle	4,904.48
Converting paint-shop into two officers' quarters	8,220,59

This yard is used largely for the manufacture of ordnance for the Navy. The extension of the railroad system, the reconstruction of store No. 10, and the water-closet for the workmen are absolutely necessary.

The distance from the city, and the expense to junior officers living there, make it very desirable that they should be furnished with quarters. Unless this be done it is a hardship upon talented officers with small compensation.

NAVY-YARD, NORFOLK, VA.

Extension of erecting-shop for Bureau of Steam Engineering	4,166.00
Extension of quay-wall	46,500.00
Extension of wharf at St. Helena	21,253.60

This yard is at present next in importance on the Atlantic coast to the New York navy-yard, in that it possesses two dry-docks and all the facilities for building and repairing men-of-war.

It is, however, very deficient in wharf-room, which can be greatly increased by the amounts asked for under quay-wall and wharf at St. Helena. Portions of the wall have already been built. If continued for four years at the rate of $50,000 per annum there will be added the most necessary wharf room.

St. Helena is on the opposite side of the river from the navy-yard proper. If its wharf is extended the receiving ship can be moved from obstructing the narrow channel and moored to it, and the men on board given that recreation, as in New York, of which they are now deprived, besides affording room for vessels in ordinary or awaiting repairs.

NAVAL STATION, PORT ROYAL, S. C.

Telephone and telegraph line between station and Port Royal, S. C.	$1,000

It is believed that contracts will be awarded for the construction of a dry-dock at this station, proposals for which have already been invited by public advertisement.

It is extremely desirable to be in telegraph communication with the Department, therefore this small sum is asked to make necessary connection.

The Government owns only a very small water-front on Parris Island on which the station is located. It would cost more to fence in the land now owned than to purchase the remainder of the island. I recommend that steps be taken to buy that part of the island not owned by the Government as, at present advised, $10,000 will be sufficient to do this.

NAVAL STATION, KEY WEST, FLA.

The wharf has been redecked, sea-wall built, and two houses erected for officers' quarters. I renew the recommendation made by my predecessor that the Mallory lot which separates the Government property into two parts, be purchased. It is desirable to have it for the storage of coal; every year it increases in value. I believe it can now be purchased for $20,000.

NAVY-YARD, PENSACOLA, FLA.

Pending a decision as to the location of a navy-yard on the Gulf ot Mexico no special appropriation is asked for this station.

The wharves are in bad order, and unless something is soon done will have to be rebuilt.

It is recommended that the sectional dry-dock at this station be sold; it has never had machinery put in place and has only a capacity of 1,500 tons, and is therefore of little use to the Navy.

NAVY-YARD, MARE ISLAND, CAL.

Gate-house and gate	$20,000.00
Widening gauge of railroad tracks	6,500.00
Extension of quay-walls	25,000.00
Roads	7,500.00
Removal and reconstruction of return wall, sectional dock basin	11,285.24
Road to cemetery, magazine, and light-house	2,500.00
One 12-ton crane	4,000.00
Artesian well	25,000.00

This is the only naval establishment on the Pacific coast. The amount asked for is not large and is necessary to its proper and economical administration. The appropriation for quay-wall should be made available at once to provide wharf room for the new vessels now building at San Francisco.

Notwithstanding former unsuccessful attempts, an artesian well should be sunk near the boiler house, where the steam could be utilized in working the boring tool. The supply of water at this yard costs the bureau $6,000 per year, and the breaking of the main leading from Vallejo would cause the cessation of work in the shops for some time. A water supply on the island is very necessary and it is believed that water can be found by sinking a well of sufficient depth.

In 1885 A. D. McDowell contracted to sink a well for the sum of

$9,750. He reached a depth of 600 feet, was paid $1,700, and abandoned the contract.

One of the bondsmen, Mr. Brown, continued the work, and discontinued it at the depth of 1,330 feet, having received $3,706.

The Government then took up the work and after serious difficulties, in removing obstructions left in the well, reached a depth of 1,505 feet, when it was found necessary to withdraw the tube on account of injury to its lower end. Many difficulties were experienced in attempts to restore the tube, and when it had been re-sunk to a depth of 1,270 feet the appropriation was exhausted and the work discontinued, after a total cost of $10,000.

No considerable amount of water was met with, and no true artesian supply.

NAVAL HOME, PHILADELPHIA, PA.

The following changes have occurred among the beneficiaries during the last fiscal year:

On the rolls July 1, 1889		195
Original admissions		21
Re-admissions		4
		220
Died	16	
Dropped, absent, and unaccounted for	5	
Transferred to Government hospital for insane	1	
Discharged at own request	1	
		23
Total on rolls July 1, 1890		197

Total expenditures during fiscal year, including annex building	$81,478.4
Total estimate for the fiscal year ending June 30, 1892	78,295.0

A table appended to this report shows in detail the expenditures and estimates.

During the past year the grounds of the Home have been well cared for and are now in excellent condition. A hydrant was placed near the stable and connected with the water-pipes, giving a supply of water for daily use, and in a position to be of great value in case of fire. A flagstone walk was laid around the new annex building, and the drains received considerable repairs. House "H" was painted and papered, and a new bath-tub put in. The main building is in such condition from age that the force of mechanics and laborers is constantly employed in making repairs. The roofs and floors of this building and the roof of the north wing of the hospital are in urgent need of extensive repairs. A part of the hospital requires painting, and much of the furniture in the dormitory and residences should be replaced.

A large addition has been made to the library, and the fund appropriated for music was wisely and beneficially expended. As the majority of the inmates are quite old, some other forms of amusement should be provided. A small appropriation would build a bowling-alley and billiard room, and the Bureau strongly recommends such action.

The annex building has been completed during the year, and has proved, as was anticipated, a most valuable addition to the main building. The old kitchen and laundry have been improved by removing the old floors and joists, and replacing them by iron beams and brick arches, which have been covered with a good layer of cement, and the walls have been cleaned and painted; the former is now an excellent store-room for provisions, and the latter has been fitted up with seven comfortable bath-rooms.

A hydraulic elevator will soon be completed, and will be of exceeding benefit to the aged and decrepit beneficiaries, as they can now be placed in the more comfortable rooms on the upper floors.

The governor of the Home renews his recommendation, and the Bureau earnestly indorses it, that the pay of the steward and master-at-arms be increased to $50 per month, that of the matron to $40 per month, and that of the house corporals to $30 per month.

The Bureau respectfully renews its suggestion that Congress take some action regarding the disposition of the property of beneficiaries who die at the Home intestate and without heirs. Congress should also authorize the sale of the wharf and adjacent property on the east bank of the Schuylkill River, with the provision that the money received for it should be placed to the credit of the Home to be used in erecting an amusement hall for the beneficiaries and in the installation of an electric light plant.

The Bureau takes pleasure in commending the excellent management of the Home, which is evidenced by the many valuable improvements, the condition of the buildings and grounds, and the contentment and health of the inmates. During the prevalence of the severe epidemic of *la grippe* in Philadelphia only three cases occurred among the beneficiaries.

The estimates are probably larger than will be required, but they are necessary, as the number of beneficiaries fluctuate; and there can be no unnecessary expenditures, as the rules governing the allowances are fixed. The appropriation should be sufficient to assure the comfort of the beneficiaries, as they have earned it by long and faithful service, and assisted in the creation of the naval pension-fund which now supports them.

INCREASE OF THE NAVY.

The new battle-ships *Maine* and *Texas* will have to be armor-plated in the dry-docks, in the interests of economy and safety, it being better to lower heavy plates than to hoist them. This will necessitate two traveling cranes for each dock at New York and Norfolk, four in all, of a capacity of about 40 tons each, the estimated cost of which is $200,000.

As it is expected that plates will be delivered by the summer of 1891 this money should be appropriated at once, under head "Increase of the Navy," so that there may be no delay.

It is very probable that it will be advantageous to the Government to use its docks to armor the vessels built by contract.

I renew very earnestly the recommendation of my predecessor that the salary of the chief clerk of this Bureau be raised to $2,250. The present incumbent has been more than thirty-three years in this Bureau; his services are invaluable, and this increase is due a faithful servant of the Government.

The disbursements of this Bureau, over which he keeps supervision, are very large, and his watchful care in that direction has resulted in there never being a deficiency. Besides this and other important duties he conducts the correspondence, which is large and varied, requiring a man of superiority and ability.

Very respectfully, your obedient servant,

N. H. FARQUHAR,
Chief of Bureau.

Hon. B. F. TRACY,
Secretary of the Navy.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892 *by the Bureau of Yards and Docks, Navy Department.*

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
SALARIES.			
For one chief clerk, increase of $200 submitted (July 11, 1890)	$2,000.00		
For one draughtsman and clerk (same act)	1,800.00		
For one clerk of class four (same act)	1,800.00		
For one clerk of class three (same act)	1,600.00		
For one clerk of class two (same act)	1,400.00		
For one clerk of class one (same act)	1,200.00		
For one clerk at $1,000* (submitted)	1,000.00		
For one assistant messenger (July 11, 1890)	720.00		
For one laborer (same act)	660.00		
		$12,180.00	$10,980.00
MAINTENANCE.			
For general maintenance of yards and docks, namely, for freight, transportation of materials and stores; books, maps, models, and drawings; purchase and repair of fire-engines, machinery; repairs on steam fire-engines and attendance on the same; purchase and maintenance of oxen, horses, and driving teams, carts, timber-wheels, and all vehicles for use in the navy-yards; boats and repairs of the same; postage on letters and other mailable matter on public service sent to foreign countries, and telegrams; stationery; furniture for Government houses and offices, and heating and lighting the same in the navy-yards; coal and other fuel; candles, oil and gas; cleaning and clearing up yards and care of buildings; attendance on fires, lights, fire-engines, and apparatus; for incidental labor at navy-yards; water tax, tolls, and ferriage; rent of four officers' quarters at Philadelphia, Pa.; pay of watchmen in navy-yards, awnings, and packing-boxes and advertising for yards and docks, and other purposes (June 30, 1890)	230,000.00	230,000.00	230,000.00
CONTINGENT.			
For contingent expenses to meet emergencies that may arise at navy-yards and stations (same act)	20,000.00	20,000.00	20,000.00
		250,000.00	250,000.00
NAVAL HOME, PHILADELPHIA, PA.			
One superintendent (same act)	600.00		600.00
One steward, increase of $120, submitted (same act)	600.00		480.00
One matron, increase of $120, submitted (same act)	480.00		360.00
One chief cook (same act)	360.00		360.00
One assistant cook (same act)	240.00		240.00
One assistant cook (same act)	180.00		180.00
One chief laundress (same act)	192.00		192.00
Four laundresses, each $168 per annum (same act)	672.00		672.00
Four scrubbers, each $168 per annum (same act)	672.00		672.00
Eight waiters, each $168 per annum (same act)	1,344.00		1,344.00
Eight laborers each $240 per annum (same act)	1,920.00		1,920.00
One master-at-arms, increase of $120, submitted (same act)	600.00		480.00
One stable-keeper and driver (same act)	360.00		360.00
Two house corporals, each $360 per annum (increase of $60 each submitted) (same act)	720.00		600.00
One barber (same act)	360.00		360.00
One painter (same act)	600.00		600.00
One carpenter (same act)	845.00		815.00
One engineer to run elevator, etc. (submitted)	600.00		
		11,345.00	
Water rent and gas (same act)	2,400.00		2,400.00
Repairs to buildings, furnaces, grates, ranges, furniture, and repairs to furniture (increase of $1,500 submitted) (same act)	6,000.00		4,500.00
Cemetery and burial expenses and head-stones (same act)	350.00		350.00
Improvement of grounds (same act)	500.00		500.00

* The services of another clerk are absolutely necessary on account of the increased work and correspondence in the Bureau because of the increase of the Navy, the building of several new dry-docks, and other works.

Estimates of appropriations required for the fiscal year, etc.—Continued.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
NAVAL HOME, PHILADELPHIA, PA.—continued.			
Music in chapel (same act)	$600.00		$600.00
Transportation of indigent and destitute beneficiaries to the Home (same act)	500.00		500.00
Erecting elevator in main building of Naval Home (same act)			4,000.00
Fitting up bath-rooms for beneficiaries (re-appropriated) (same act)			800.00
Support of beneficiaries (same act)	56,600.00		
		$66,950.00	50,000.00
		78,295.00	73,915.00
REPAIRS AND PRESERVATION.			
For navy-yards and stations (June 30, 1890)	300,000.00	300,000.00	250,000.00
NAVY-YARDS AND STATIONS.			
Navy-yard, Portsmouth, N. H.:			
For constructing reservoir and perfecting water system, submitted (June 30, 1890)	22,287.00	22,287.00	62,430.00
Navy-yard, Boston, Mass.:			
For constructing steel shears, submitted (same act)	12,000.00		
For extensions and renewal in water pipe system, submitted (same act)	5,000.00		
		17,000.00	50,000.00
Navy-yard, Brooklyn, N. Y.:			
For two cranes, submitted (same act)	10,000.00		
For quay-wall on cob dock, subihitted (same act)	118,833.60		
For paving and sewers around new dry-dock, submitted (same act)	21,835.00		
		150,668.60	170,000.00
Navy-yard, League Island, Pa.:			
For west dry-dock pier, submitted (same act)	87,441.62		
For cranes for Broad street wharf, submitted (same act)	15,000.00		
For riprap for protection wall, submitted (same act)	9,150.00		
For light retaining-wall, continuation of, submitted (same act)	25,000.00		
For sewer and flushing tank, submitted (same act)	5,685.00		
		142,276.62	145,000.00
Navy-yard, Washington, D. C.:			
For extension of railroad tracks, submitted (same act)	3,567.50		
For restoring and adapting store-house No. 10 for ordnance, submitted (same act)	30,499.10		
For dry closets for Smith's quadrangle, submitted (same act)	4,904.48		
For converting paint shop into two officers' quarters submitted (same act)	8,220.59		
		47,191.67	15,000.00
Navy-yard, Norfolk, Va.:			
For extension of erecting shop for steam engineering, submitted (same act)	4,166.00		
For extension of quay wall, submitted (same act)	46,500.00		
		50,666.00	40,000.00
Naval station, Port Royal, S. C.:			
For telephone and telegraph line between station and Port Royal, S. C., submitted (same act)	1,000.00	1,000.00	200,000.00
Navy-yard, Mare Island, Cal.:			
For widening gauge of railroad tracks, submitted (same act)	6,500.00		
For extension of quay-wall, submitted (same act)	25,000.00		
For removal and reconstruction of return wall, sectional dock basin, submitted (same act)	11,285.24		
For roads, submitted (same act)	5,000.00		
For road to cemetery, magazine, and light-house, submitted (same act)	2,500.00		
For one 12-ton crane, submitted (same act)	4,000.00		
For artesian well, submitted (same act)	25,000.00		
		79,285.24	80,000.00
Navy-yards, New York and Norfolk:			
For launching ways and slips, submitted (same act)	13,000.00	13,000.00	13,000.00
Naval station, Key West, Fla (same act)			1,000.00
Naval station, New London, Conn. (same act)			6,500.00
Commissions on dry-docks (same act)			15,000.00
		523,375.13	797,930.00

Estimates of appropriations required for the fiscal year, etc.—Continued.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
CIVIL ESTABLISHMENT.			
Navy-yard, Portsmouth, N. H.:			
One clerk, at $1,400 per annum (June 30, 1890)	$1,400.00		
One mail messenger, at $2 per diem* (same act)	730.00		
One messenger, at $600 per annum (same act)	600.00		
One foreman laborer and head teamster, at $4 per diem* (same act)	1,460.00		
One pilot, at $3 per diem* (same act)	1,095.00		
One janitor, at $600 per annum (same act)	600.00		
One foreman mason, when required, at $4.50 per day (submitted)	1,408.50	$7,293.50	$5,885.00
Navy-yard, Boston, Mass.:			
One clerk, at $1,400 per annum (same act)	1,400.00		
One foreman laborer, at $4 per diem (same act)	1,252.00		
One messenger to commandant, at $1.76 per diem (same act)	550.88		
One messenger, at $1 76 per diem (same act)	550.88		
One mail messenger, at $2 per diem* (same act)	730.00		
One writer, at $900 per annum (same act)	900 00	5,383.76	5,383.76
Navy-yard, Brooklyn, N. Y.:			
One clerk, at $1,400 per annum (same act)	1,400.00		
One writer, at $1,017.25 per annum (same act)	1,017.25		
One master of tugs, at $1,500 per annum (same act)	1,500.00		
One master of tugs, at $1,500 per annum (submitted)	1,500.00		
Two writers, at $900 per annum each (same act)	1,800.00		
One writer, at $900 per annum (submitted)	900.00		
One foreman laborer, at $4.50 per diem (same act)	1,408.50		
One mail messenger, at $2 per diem* (same act)	730.00		
Two messengers, at $2.25 per diem,* each (same act)	1,408.50		
One draughtsman, at $5 per diem (same act)	1,565.00		
One quarterman, at $3 per diem (same act)	939.00		
One superintendent of teams, or quarterman, at $4 per diem (same act)	1,252.00		
One messenger to commandant, at $2.25 per diem* (same act)	821.25	16,241.50	13,841.50
Navy-yard, League Island, Pa.:			
One clerk, at $1,400 per annum (same act)	1,400 00		
One writer and telegraph operator, at $1,000 per annum (same act)	1,000.00		
One messenger, at $2 per diem (same act)	626.00		
One foreman laborer, at $4 per diem (same act)	1,252.00		
One draughtsman, at $5 per diem (submitted)	1,565.00	5,843.00	4,278.00
Navy-yard, Washington, D. C.:			
One clerk, at $1,400 per annum (same act)	1,400.00		
One messenger, at $2 per diem (same act)	626.00		
One foreman laborer, at $4 per diem (same act)	1,252.00		
One electrician to care for and be in charge of electric plant for electric lighting and fire alarm (submitted)	1,017 25	4,295.25	3,278.00
Navy-yard, Norfolk, Va.:			
One clerk, at $1,400 per annum (same act)	1,400 00		
One writer, at $1,017.25 per annum (same act)	1,017.25		
One writer, at $1,000 per annum (same act)	1,000.00		
One foreman laborer, at $4 per diem (same act)	1,252.00		
One mail messenger, at $2 per diem* (same act)	730.00		
Two messengers, at $2 each per diem (same act)	1,252.00		
One pilot, at $2 26 per diem (same act)	707.38		
One draughtsman, at $5 per diem (submitted)	1,565.00	8,923.63	7,358.63
Navy-yard, Pensacola, Fla.:			
One clerk, at $1,200 per annum (same act)	1,200.00		
One mail messenger, at $2 per diem* (same act)	730.00	1,930.00	1,930.00
Navy-yard, Mare Island, Cal.			
One clerk, at $1,400 per annum (same act)	1,400.00		
One writer, at $1,017.25 per annum (same act)	1,017 25		
One foreman mason, at $6 per diem (same act)	1,878.00		
One foreman laborer, at $5.50 per diem (same act)	1,721.50		
One pilot, at $4.80 per diem (same act)	1,502.40		

* Including Sundays.

Estimates of appropriations required for the fiscal year, etc.—Continued.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
CIVIL ESTABLISHMENT—continued.			
Navy-yard, Mare Island, Cal.—Continued.			
One draughtsman, at $5 per diem (same act)	$1,565.00		
One mail-messenger,* at $2.74 per diem† (increase of 74 cents per diem, submitted) (same act)	1,000.10		
One messenger, at $2 per diem (same act)	626.00		
One messenger and lamp-lighter, at $2 per diem (same act)	626.00		
One electrician, to care for and be in charge of plant for electric lighting (submitted)	1,500.00	$12,836.25	$11,066.15
Naval station, Sacket's Harbor, N. Y.:			
One ship-keeper, at $1 per diem* (same act)	365.00	365.00	365.00
Naval station, New London, Conn.:			
One mail-messenger, at $600 per annum (submitted)	600.00	600.00	
Naval station, Key West, Fla.:			
One messenger, at $600 per annum (same act)	600.00	600.00	600.00
		64,311.89	53,986.04
INCREASE OF THE NAVY.			
Four cranes, 40 tons capacity (submitted)			200,000.00
NOTE.—The new battle ships *Maine* and *Texas* will have to be armor-plated in the dry-docks, in the interest of economy and safety, it being better to move heavy plates than to hoist them. This will necessitate two traveling-cranes for each dock, at New York and Norfolk, four in all, of a capacity of about 40 tons each, the estimated cost of which is $200,000. As it is expected that plates will be delivered by the summer of 1891, this money should be appropriated at once, under head Increase of the Navy, so that there may be no delay. It is very probable that it will be advantageous to the Government to use its docks to armor the vessels built by contract.—N. H. FARQUHAR, *Chief of Bureau.*			

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† To restore to former pay in consideration of his arduous duties.
* Including Sundays.

BOARD FOR THE PERMANENT IMPROVEMENT OF U. S. NAVY-YARD, LEAGUE ISLAND.

PHILADELPHIA, PA., *October* 10, 1889.

SIR: In obedience to the orders of the honorable Secretary of the Navy of July 25, 1889, the Board met at League Island navy-yard on August 6, 1889, and, after looking over the ground, decided to meet thereafter at the U. S. Naval Home, as a more convenient place.

The Board, in preparing a plan for the future development of the yard, has not sought to lay out works to cover the entire site, but has striven rather to design a yard of the first magnitude, in the most compact and concentrated form consistent therewith.

But it will be seen by reference to the accompanying general plan that it will admit of still further development in the matter of dry-docks, building-slips, and accessory structures, whenever the military necessities of the country require them at this point

League Island station is situated at the junction of the Delaware and Schuylkill Rivers, has an area of 923 acres, which is greater than the combined acreage of the dock-yards of Great Britain and of any continental power in Europe. The island is formed of alluvial deposits resting upon a bed of gravel, the soil varying in depth from 16½ feet to 55 feet below the plane of mean low water. It is separated from the mainland by a sheet of water known as the Back Channel, and connected at the foot of Broad street by a causeway with a short bridge in the center. It is over 90 miles from the sea, and though the rise of the tide is usually about 6.2 feet, salt water never reaches it.

The conflicting assertions appearing in various reports upon League Island in regard to the practicability of obtaining satisfactory foundations for heavy structures have led the Board to make a complete series of test borings for itself.

These borings, with the records of others made in former years, show the island to consist of an alluvial deposit, composed in places of silt, in others of fine sand, from 12 to 55 feet thick, resting upon a firm, and in some places almost impenetrable, stratum of compacted gravel, rounded stones, and occasional bowlders.

This substratum slopes gradually from north to south across the island, as shown on the plan. It is encountered at a depth below the plane of mean low water, varying from 16¼ feet to 55 feet, and its thickness is indeterminate.

For the construction of dry-docks, basins, and similar works nothing could be more favorable than this easily excavated alluvial soil with the solid gravel stratum underlying it, at or just below the bottom of the basin or dock.

On the other hand, for large structures, sea-walls, tool foundations, etc., piles of moderate length easily driven through this light alluvion to a firm bearing in the gravel, form an unyielding, inexpensive, simple, and indestructible foundation.

In projecting the plan of the yard, the Board has utilized these peculiar advantages to the best of its ability.

The distinctive characteristics of League Island, viz, an alluvial formation at the confluence of two rivers, with deep water adjacent on two or three sides; a firm underlying stratum; a surface level but little above the river, so that material excavated from basins and docks may be deposited close by without expense, to raise the surface to grade, are the very features which experience has taught engineers abroad are to be sought in locating docks and dock-yards.

Note the commercial docks on the Thames, the Wilhelmshafen, and other great foreign dock-yards.

The estimates for the complete development of the yard may give the impression of an extremely costly yard when compared with our other yards, but a reference to the plan with the facilities, etc., shown, when compared with the largest foreign dock-yards, as Portsmouth, Wilhelmshafen, Cherbourg, Brest, and Spezzia (which have cost from ten to twenty millions, and are still incomplete), will show that the outlay is a moderate sum in consideration of the facilities provided for construction, repair, and outfit of ships-of-war, and its strategic value.

As a strategic naval point it is unquestionably the most important upon the Atlantic coast. This can readily be seen from the accompanying plans submitted. (See plan B.)

In the present condition of the Navy, it is believed that in the event of hostilities the ports on the Atlantic coast of the United States could be put under contribution by fleets within a few weeks after the declaration of war. Philadelphia alone is the exception; for its position makes it practically impregnable to naval attack; and in addition its blockade would be extremely difficult, if not actually impossible.

Now, should League Island be made what the Board proposes it shall be, there will be room in its basins for all the armored vessels we may possess, as well as an indefinite number of cruisers, torpedo and other vessels of war.

Were these vessels in existence they could even now fight their way to the assistance of the points attacked either north or south; but should as a military measure the canals (indicated in plan B) be enlarged, vessels could pass through on the short lines, and arrive in perfect condition ready for battle. At present these canals admit the passage of torpedo-boats and small vessels not drawing more than 7 feet of water.

It is the opinion of the Board that this navy-yard should possess all facilities and appliances for building, equipping, and repairing all kinds of naval vessels, including torpedo vessels.

It is also the opinion of the Board that this is a proper place to establish a plant for the manufacture of great and small guns.

It is proposed that the portion of the back channel east of the causeway shall be filled in and used as a rifle-range, and in connection therewith, grounds for proving great guns, as is now done near Annapolis.

A most important point to be found at this station is the fact that all vessels stored here would depart with clean bottoms, as the water is fresh.

The fact of this station being in such close proximity to the coal and iron mines, and in the neighborhood of so many works of different kinds connected with ship-building and supplies, is seen in a much stronger light now than when attention was first called to it.

In this plan it is proposed that ships shall be stored in such a state of readiness that they can be under way within thirty-six hours from the time an order to that effect is received.

It is believed that none of the modern vessels can be placed "in ordinary," as generally understood; but that each ship must have officers and men to take care of them.

The Board especially desires to impress upon the Bureau the urgent importance of ample and regular appropriations for the prosecution of this work to its completion.

In just the proportion that appropriations are ample and regular will the work be carried on economically, and the yard attain that condition of effectiveness which will make it a powerful factor in the construction and maintenance of the new Navy, and in the strategic control of the central Atlantic coast.

The detailed description of the entire work to be done is as follows, and is made in connection with the accompanying plans:

DESCRIPTION OF PLANS.

The salient features of the final and complete plan presented by the Board (see accompanying plan A) may be briefly outlined as follows:

1. The conversion of that portion of the back channel, lying west of Broad street, into a deep and spacious reserve basin.
2. The construction of a smaller but still spacious building and repair basin, opening into the reserve basin, and communicating with the Delaware Channel in front of the Island by a canal.
3. The location of the dry-docks and building-slips on the space lying between the building and repair basin and the Delaware front, the dry docks opening into the basin, and the slips fronting the Delaware; the plate and bending shops being between the two.
4. The concentration of all the other shops and structures pertaining to ship construction, fitting, repair, and armament, in the central space inclosed by the building and repair basin, dry-docks, and building-slips, on the west; Broad street, the main avenue of the yard, on the east; the Delaware on the south; and the reserve basin on the north.
5. The utilization of the strip of Government property north of the back channel, for store-houses for the reserve ships and for coal-sheds.
6. The location of all quarters on the Delaware front of the yard east of Broad street.
7. The filling of that portion of the back channel lying east of Broad street and utilizing it for a rifle range and proving ground.
8. The construction of a permanent retaining-wall along the entire Delaware and Schuylkill front of the Government property.

The Board has been a unit in recognizing the fact that ample and convenient basin room is one of the vital requisites of a great naval station, and the exceptionally favorable natural conditions here existing have enabled it to project basins of the capacious dimensions which it considers essential to their highest degree of utility, and the Board believes the arrangement proposed is as convenient and effective as can be devised.

The total basin area is 156.4 acres, which is greater than the combined basin area of either the English or French dock-yards.

To the subject of dry-docks and building slips the Board has devoted much study, and has provided a number of building slips for the construction of the smaller classes and lighter types of vessels. It believes, however, that the only proper method of constructing the larger vessels, and especially the armor-clads, both on the score of rapidity, economy, and safety, is in graving docks, and it has estimated for six such docks.

The arrangement of the docks and slips in two parallel lines, head to head, with the plate, punching, bending, and riveting machinery between them; and the location of the large and important shops of the Bureaus of Steam Engineering, Ordnance, Equipment and Recruiting, and Navigation in such a manner as to give them an extensive water front on each basin will be exceptional in its economy of time and transportation of material, and its facilities for the rapid construction and fitting out of vessels in a sudden emergency.

The rectangular space on which the Board has located the construction, steam engineering, armor, and ordnance shops, iron, store-house, armor dock, and the building for heat, light, and power plants, is not only central, but presents the most favorable conditions for the construction of the foundations of such structures of any portion of the island, the gravel substratum occurring here at a depth of from 16.5 feet to 21 feet below the plane of mean low water.

In addition to the general points above noted, the Board, without giving estimates, has indicated where in its opinion should be located a hospital, barrracks for men, additional docks, and building slips, an ordnance foundry, a storage yard for torpedo boats, ropewalk, and marine barracks.

It is believed that the accompanying plans and drawings are sufficiently full and clear to render a more minute description unnecessary.

The capacity of the yard completed on the above lines will be equal to that of the largest of foreign dock-yards, and greater than all our other navy-yards combined, owing largely to its compactness, economy, and convenience of arrangement and extent of water front and basin area.

Accompanying this report are the following plans:

A—General plan of League Island yard (showing improvements recommended by Board).
B—Chart showing strategic value of League Island.
C—General plan of protection wall.
D—Cross-section of west causeway.
E—General plan of piers.
F—General plan of light retaining-wall.
G—General sections and elevations of shops.
H—Plan of the completed yard.
I—Cross section through the completed yard.

The detailed estimates, based upon the above plans, for the complete development of the yard, are as follows:

Building and repair basin excavation	$369,145.00
Building and repair basin quay wall	376,800.00
Canal excavation	46,209.50
Canal quay wall (see plan C)	300,000.00
Canal caissons	80.000.00
Reserve basin excavation	1,304,829.00
Reserve basin quay wall (see plan C)	1,260,000.00
West causeway (see plan D)	617,500.00
West causeway caisson	40,000.00
Repairs to Broad-street pier	94,400.00
Delaware piers (see plan E)	459,415.00
Delaware quay wall (see plan C)	115,560.00
Retaining-wall (see plan F)	97,998.00
Widening dikes to 100 feet (see plan F)	43,245.00
Dredging	72,243.00
Building and repair docks (four)	2,400,000.00
Armor docks (two)	1,200,000.00
Building slips (eight)	280,000.00
Plate and bending shop	784,960.00
Steam engineering shop (see plan G)	661,200.00
Ordnance shop (see plan G)	436,600.00
Equipment and recruiting and navigation shop (see plan G)	325,200.00
Armor shops	660,000.00
Construction shops	582,000.00
Torpedo-boat shops and basin	130,000.00
Ships' store-houses	90,000.00
Iron store-houses	261,000.00
Coal sheds and tips	40,000.00
Gateway and guard-house	12,600.00
Building for steam heating, electric lighting, and hydraulic-power plant.	60,000.00
Commandant's office	53,000.00
Paymaster's office	19,000.00
Surgeon's office	19,000.00
Commandant's quarters	30,000.00
Officers' quarters (twenty) and filling and grading about the same	233,200.00
Warrant officers' quarters	20,000.00
Railroad tracks	79,000.00
Widening Broad-street causeway and closing sluiceway	12,000.00
Swing bridge over canal	75,000.00
Brick wall along north side of yard	156,600,00
Roads, pavements, and sidewalks	437,776.00
Sewers and drains	50,000.00
Water-supply system	100,000.00
Electric-light plant	80,000.00
Total	14,565,480.50

No estimate is made for filling the eastern portion of the back channel nor for grading the remainder of the yard.

The closing of the Broad-street causeway will result in the rapid silting up of the back channel, and the remainder of the filling can be done with the material excavated from the reserve basin.

The material from the building and repair basin and the docks will be sufficient to bring the working portion of the yard to grade.

The proposed permanent improvements recommended to be first undertaken are as follows:

Building and repair basin excavation	$369,145.00
Building and repair basin quay wall	376,800.00
Canal excavation	46,209.50
Canal quay wall	300,000.00
Canal caissons	80,000.00
West causeway	617,500.00
West causeway caisson	40,000.00
Delaware quay wall	115,560.00
Delaware piers (five)	459,415.00
Repairs to Broad-street pier	94,400.00
Retaining wall	97,998.00
Widening dikes to 100 feet	43,245.00
Dredging	72,243.00
Armor dock	600,000.00
Building slips (three)	105,000.00
Plate and bending shop (400 feet)	285,400.00
Steam engineering shop (north half)	393,000.00
Equipment and recruiting and navigation shop (north half)	183,000.00
Ordnance shop (north half)	257,800.00
Building for steam heating, electric lighting, and hydraulic-power plant	60,000.00
Cammandant's office	53,000.00
Commandant's quarters	30,000.00
Officers' quarters (six), and filling and grading about the same	73,000.00
Warrant officers' quarters	20,000.00
Widening Broad-street causeway and closing sluiceway	12,000.00
Railroad tracks	65,200.00
Swing bridge over canal	75,000.00
Roads, pavements, and sidewalks	50,000.00
Sewers and drains	20,000.00
Water-supply system	40,000.00
Electric-light plant	50,000.00
Coal shed	20,000.00
Brick wall along north side of yard	156,600.00
Gateway and guard-house	12,600.00
Total	5,274,155.50

The above improvements, with those now existing at the yard, will give the yard a capacity for effective work equal to that of the best of our other navy-yards to-day.

And we estimate the amount of money necessary to properly commence operations at $1,596,000, to be applied to the following objects:

Closing and widening Broad-street causeway, and laying railroad tracks from Government avenue to and on Broad-street pier	$30,000.00
East dry-dock pier	57,000.00
West dry-dock pier	80,500.00
Quay wall on Delaware front	75,000.00
Dredging and filling in	75,000.00
Light retaining-wall	25,000.00
Officers' quarters (six) and furniture	70,000.00
Pavement, Broad street	21,000.00
One building slip	35,000.00
Plate and bending shop (100 feet)	75,000.00
Canal walls	300,000.00
West causeway	617,500.00
Caisson	40,000.00
Broad-street pier	95,000.00
Total	1,596,000.00

Very respectfully,

EDWARD E. POTTER,
Captain, U. S. N.
N. H. FARQUHAR,
Captain, U. S. N.
WILLIAM WHITEHEAD,
Captain, U. S. N.
ENDICOTT,
Engineer, U. S. N.
U. S. N.

Capt. GEORGE B. WHITE, U.
Chief of Bureau of Y
Navy Depart

No. 1—*Report of expenditures at navy-yards, stations, and naval asylum for the year ending June 30, 1890.*

Yards and stations.	Appropriations.					
	Yard improvements and Naval Home.	Repairs and preservation.	General maintenance.	Civil establishment.	Contingent.	Total.
Portmouth, N. H		$25,005.02	$13,638.43	$5,755.00		$44,398.45
Boston, Mass	$28,474.74	22,400.25	18,436.82	4,333.72		73,645.53
New London, Conn		2,026.76	5,667.23			7,693.99
New York, N. Y	278,697.87	49,004.15	34,335.19	9,437.46		371,474.67
League Island, Pa	343,369.27	14,327.63	15,071.58	3,278.00		376,046.48
Washington, D. C	28,846.54	20,998.94	13,477.91	3,168.39	$480.00	66,971.78
Norfolk, Va	30,242.83	61,690.10	19,357.45	6,269.19	1,147.50	118,707.07
Pensacola, Fla		8,056.75	10,613.02	1,800.00		20,469.77
Mare Island, Cal	99,010.43	49,180.01	30,142.92	12,053.48		190,836.84
Sacket's Harbor, N. Y				365.00	33.00	398.00
Key West, Fla	7,926.00	4,236.04	1,489.61			13,651.65
Naval Home, Pa	*66,915.40					66,915.40
Wharf at Erie, Pa					500.00	500.00
Port Royal, S. C	3,000.00	340.50	1,522.95		67.50	4,930.95
	886,483.08	257,266.15	163,753.11	46,460.24	2,228.00	1,356,190.58

* This is for the entire support of the Naval Home, is a separate appropriation, and placed under this head for convenience only.

No. 2.—*Detailed report from navy-yards and stations of expenditures under "Repairs and Preservation" during the fiscal year ending June* 30, 1890.

Objects.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.	Norfolk.	Pensacola.	Mare Island.	Key West.	Port Royal.	Total.
Yard buildings	$3,030.69	$5,181.66	$191.66	$10,227.55	$5,977.40	$10,910.75	$21,405.92	$1,696.10	$3,638.26	....	$80.00	$62,339.99
Officers' quarters	2,857.99	4,637.10	1,146.07	4,752.07	1,263.05	2,298.42	3,132.55	1,634.19	6,732.03	$2,248.04	30.00	30,731.51
Wharves, bridges, landings, and boats	241.20	118.40	128.43	1,310.85	350.03	29.12	982.47	412.55	11,008.54	1,988.00	60.00	16,629.59
Roads, walks, gutters, and drains	2,902.59	2,053.91	483.25	16,131.00	1,704.99	3,148.20	3,093.86	191.27	5,520.65	....	20.00	35,250.75
Fences and walls	136.16	161.44	35.00	487.05	27.04	65.93	319.80	647.18	1,318.21	....	10.00	3,207.81
Cranes, scows, and derricks	27.12	7.60	....	3,109.55	380.40	105.41	16,400.39	60.47	1,477.12	....	....	21,568.09
Furnaces, forges, heating apparatus, etc	3,459.92	3,676.19	....	3,846.97	67.93	1,171.24	1,029.06	289.34	2,704.32	....	....	16,244.97
Tracks and scales	181.89	....	....	114.56	....	898.39	1,338.83	40.74	126.26	....	....	2,700.67
Water and gas works	1,879.84	999.12	....	862.47	....	1,036.06	836.37	720.16	4,515.22	....	....	10,849.24
Dredging and scowing	....	....	....	2,002.00	....	63.47	....	....	1,808.30	....	....	3,873.77
Dry docks	*4,236.86	337.08	....	....	....	....	1,074.87	†712.82	295.00	....	....	6,656.63
Miscellaneous repairs	6,050.76	2,481.02	42.35	6,160.08	3,281.29	1,261.92	12,105.98	1,621.93	10,036.10	....	140.50	43,181.93
Repairs to dikes	....	....	....	....	1,275.50	....	....	....	....	....	....	1,275.50
Coal	....	2,745.00	....	....	....	....	....	....	....	....	....	2,745.00
Transfer to other bureaus	....	1.70	....	....	....	....	....	....	....	....	....	1.70
	25,005.02	22,400.25	2,026.76	49,004.15	14,327.63	20,998.94	61,690.10	8,056.75	49,180.01	4,236.04	340.50	257,266.15

* Wooden balance dock.

† Sectional dock.

No. 3.—*Detailed report of expenditures under "General maintenance" received from yards and stations during the fiscal year ending June 30, 1890.*

Objects.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.	Norfolk.	Pensacola.	Mare Island.	Key West.	Port Royal.	Total.
Freight and transportation	$159.46			$121.36		$4.17			$2,795.32			$3,080.31
Printing, stationery, and advertising		$394.11	$23.75	953.11	$177.48	346.50	$346.48	$110.69	585.63	$33.25		2,971.00
Books, maps, models, and drawings				6.00	6.50	59.28	60.80					132.58
Purchase and repair of fire-engines				28.92	61.07	79.52	508.28	538.92	452.15		$10.00	1,678.86
Machinery of every description and patent rights		27.25		379.55	23.65	124.41	99.00	40.29	10.56			704.71
Repairs on steam-engines and attendance on same				404.34		25.96	722.13	44.75	23.00			1,220.18
Purchase and maintenance of oxen and horses, pay of hired teams, etc	3,059.34	2,065.42	680.97	3,607.69	4,671.15	3,395.78	3,219.17	1,356.04	4,264.19		123.00	26,442.75
Carts, timber-wheels, and tools of every description	214.11	638.92	25.28	2,835.53	1,130.07	1,802.26	1,294.15	190.59	38.80		144.00	8,313.71
Postage on letters on public service and telegrams		4.00	21.17	257.90	18.27	16.00			68.39			385.73
Furniture for Government houses and offices in navy-yards	990.27	761.38	1,073.95	2,605.27	213.34	499.74	1,747.00	113.80	1,485.57		350.75	9,841.07
Coal and other fuel		3,213.46	11.75	4,332.55	341.69	734.04	257.47	118.95	2,405.41		161.40	11,579.72
Candles, oil, and gas	941.06	1,058.21		2,465.14	89.61	1,007.11	1,013.00	256.83	3,151.58		188.80	10,171.34
Cleaning and clearing up yards and care of buildings	554.88	1,965.57	819.90	184.16	272.93	3,783.11	1,826.60	722.27	1,100.62		502.00	11,732.04
Attendance on fires, lights, fire-engines, and apparatus	846.80	1,904.44	657.45	3,123.86	2,484.52	794.24	954.56	1,588.85	1,051.42			13,406.14
Incidental labor, not chargeable to other appropriations	3,015 82		111.69	19.50	99.40	664.26	183.50		2,159.40			6,253.57
Water tax		1,573.81		7,132.68			915.64	156.80	5,255.36	53.40		15,117.69
Tolls and ferriage				100.00			88.75	60.00	2,963.87			3,212.62
Pay of watchmen	3,800.56	3,614.25	2,190.00	5,636.44	2,686.00		5,973.00	5,311.84	2,204.40	1,395.00		32,811.49
Flags, awnings, and packing-boxes	56.13	25.00	51.32	141.19	76.23	141.53	117.92	2.40	127 25	7.96	43.00	789.93
Rent of landings												
Rent of officers' quarters, Philadelphia, Pa					2,716.67							2,716.67
Pay of teamsters		1,191.00										1,191.00
Total	13,638.43	18,436.82	5,667.23	34,335.19	15,071.58	13,477.91	19,357.45	10,613.02	30,142.92	1,489.61	1,522.95	163,753.11

No. 4.—*Estimates received from navy-yards, stations, and Naval Asylum for fiscal year ending June 30, 1892.*

Yards and stations.	Appropriations.				Total.
	Yard improvements and Naval Home.	Repairs and preservation.	General maintenance.	Civil establishment.	
Portsmouth, N. H	....	$64,000.00	$30,500.00	$9,545.50	$104,045.50
Boston, Mass	$290,447.68	98,062.00	32,000.00	7,869.00	428,378.68
New London, Conn	37,460.60	3,847.05	10,271.94	1,500.00	53,079.59
New York, N. Y	1,178,447.55	242,224.25	109,331.10	16,662.50	1,546,665.40
League Island, Pa	1,047,438.19	50,084.28	41,405.46	12,379.92	1,151,307.85
Washington, D. C	72,130.29	49,500.00	26,138.74	5,871.25	153,640.28
Norfolk, Va	348,169.60	94,349.86	81,703.30	12,061.88	536,284.64
Pensacola, Fla	....	77,104.35	18,983.37	2,480.00	98,567.72
Mare Island, Cal	374,262.14	70,750.79	50,300.00	13,494.44	508,807.37
Sacket's Harbor, N. Y	....	1,000.00	....	....	1,000.00
Key West, Fla	20,000.00	4,778.10	1,916.00	600.00	27,294.10
Naval Home, Pa	77,695.00	....	....	....	77,695.00
Port Royal, S. C	1,000.00	930.00	2,797.00	900.00	5,627.00
Total	3,447,051.05	756,630.68	405,346.91	83,364.49	4,692,393.13

No. 5.—*Detailed estimates from yards and stations for works of improvement for the fiscal year ending June 30, 1892.*

Yard, stations, and objects.	Estimates.	Total.
BOSTON, MASS.		
For remodeling building No. 32	$7,713.76	
For timber wharf No. 1	15,776.80	
For sheers	12,000.00	
For electric light plant	9,500.00	
For paving and grading	14,972.00	
For timber wharf No. 5	25,485.12	
For dry-dock	50,000.00	
For wet basin	50,000.00	
For quay wall	100,000.00	
For water pipes	5,000.00	$290,447.68
NEW LONDON, CONN.		
For water supply	9,664.00	
For alteration, drill-hall extension	2,166.50	
For sewer	431.20	
For building for latrines	1,372.40	
For building for water tank and pipe	2,345.50	
For alteration of store-house No. 1	1,233.00	
For alteration of store-house No. 2	1,768.00	
For plank or asphalt walk	1,530.00	
For alteration of house "A"	950.00	
For house for commandant	10,000.00	
House for surgeon	6,000.00	37,460.60
NEW YORK, N. Y.		
For boundary wall, from Wallabout Channel along Washington and Flushing avenues to Marine Barracks	95,068.00	
For three small cranes for dry-dock and water front	15,000.00	
For building No. 40, Yards and Docks workshop	116,917.44	
For building No. 27, construction workshop near new dry-dock	112,611.16	
For building No. 81, bending and blacksmith shop	34,448.55	
For building No. 18, dispensary and medical store-house	17,957.12	
For building No. 33, extension of store-house for provisions and clothing	36,878.91	
For opening an entrance way and gateway, Sands street	2,442.72	
For building No. 23, oil and paint store	124,238.60	
For building No. 28, extending boiler-shop wing	44,755.70	
For building No. 28, blacksmith and coppersmith shop	35,039.20	
For building No. 28, erecting shop	69,549.48	
For quay wall on cob-dock from H. to D	89,808.00	
For quay wall navy-yard from N. W. boundary to ship slip D	68,600.75	
For quay wall cob-dock from R. to O	29,025.60	
For quay wall cob-dock entrance to Whitney basin to Pontoon bridge	41,939.62	
For quay wall Whitney basin from D to C	68,600.75	
For dredging in Whitney basin	55,000.00	
For paving an 18-inch sewer around new dry-dock	21,835.00	
For sidewalks on Warrington, Perry, and McDonough avenues, together with sections of Second, Third, Fourth, Fifth, and Sixth streets, paving and laying same	98,731.00	1,178,447.55

No. 5.—*Detailed estimates from yards and stations, etc.*—Continued.

Yard, stations, and objects.		Estimates.	Total.
LEAGUE ISLAND, PA.			
For east dry-dock pier		$82,453.60	
For west dry-dock pier		87,441.62	
For cranes for Broad street wharf		25,000.00	
For protection wall		61,750.00	
For rip-rap for protection wall		9,150.00	
For light retaining wall		25,000.00	
For sewer and flushing tank		5,685.12	
For artesian well, pump house, and pumping plant		20,000.00	
For officers' quarters (3) and furniture		35,000.00	
For commandant's office		53,735.59	
For railroad track		18,409.25	
For widening causeway		13,813.01	
For dredging and filling in and widening dikes to 100 feet		200,000.00	
For one building slip		35,000.00	
For plate and binding shop (100 feet)		75,000.00	
For canal walls		300,000.00	$1,047,438.19
WASHINGTON, D. C.			
Extension of yard railroad:			
For turnout to 10-ton crane	$644.92		
For turnout to 20-ton crane	1,324.71		
For turnout to shell house	1,597.87		
Reconstruction of store No. 10:		3,567.50	
For repairs to main roof	$1,198.83		
For tearing down and removing stack	460.00		
For columns, gallery, supports, etc	15,055.80		
For retaining wall for and laying floor	13,784.47		
Smead dry-air closets for Smith quadrangle:		30,499.10	
For north closet	$2,044.85		
For south closet	2,859.63		
Reconstruction of the breech mechanism shop:		4,904.48	
For new skylight	$2,895.40		
For removal of offices, etc	1,796.73		
For printing	1,535.25		
For laying new floor	11,838.37		
For extending inspection room	5,873.87		
For removing boiler and tearing down boiler house	1,000.00		
New officers' quarters:		24,935.62	
For changing paint-shop No. 1 into two quarters		8,220.59	72,130.29
NORFOLK, VA.			
For new iron floating-gate for stone dry-dock		36,000.00	
For repairs to stone dry-dock		100,000.00	
For improvement to timber basin		140,250.00	
For extension of erecting shed		4,166.00	
For extension of wharf at navy-yard, Norfork, Va		46,500.00	
For extension of wharf at St Helena		21,253.60	348,169.60
MARE ISLAND, CAL.			
For caisson		36,000.00	
For dredging		10,890.00	
For gate and gate-house		20,000.00	
For widening gauge of railroad track		6,500.00	
For extension of quay wall		155,000.00	
For roads		25,000.00	
For removal of return wall sectional dock basin		11,285.24	
For fences		6,000.00	
For road to cemetery, magazine, etc		22,500.00	
For three 12-ton cranes along water front		12,000.00	
For artesian well		25,000.00	
For rolling-mill for steam engineering		40,000.00	
For timber-shed		4,086.90	374,262.14
KEY WEST, FLA.			
For the purchase of the Mallory lot		20,000.00	20,000.00
U. S. NAVAL HOME, PHILADELPHIA, PA.			
For support of beneficiaries, improvements, and all expenses		77,695.00	77,695.00
PORT ROYAL, S. C.			
For telegraph and telephone line between station and Port Royal, S. C.		1,000.00	1,000.00
Total			3,447,051.06

No. 6.—*Detailed estimates from navy-yards and stations for "repairs and preservation" for the fiscal year ending June 30, 1892.*

Objects.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.	Norfolk	Pensacola.	Mare Island.	Sacket's Harbor.	Key West.	Port Royal.	Total.
Yard buildings	$25,000.00	$60,562.00	$862.00	$181,294.25	$14,359.96	$20,000.00	$47,428.86	$8,492.64	$27,861.29	....	$1,017.50	$150.00	$387,028.50
Officers' quarters	3,000.00	5,000.00	1,469.45	5,800.00	1,073.65	4,000.00	4,121.00	7,800.00	4,267.50	....	....	150.00	36,681.60
Wharves, bridges, landings and boats	5,000.00	1,000.00	1,010.60	6,905.00	431.51	2,500.00	3,700.00	25,458.04	3,500.00	....	2,375.20	150.00	52,033.35
Roads, walks, gutters, and drains	3,000.00	13,000.00	250.00	3,130.00	606.20	6,000.00	15,000.00	1,283.38	8,000.00	....	....	125.00	50,394.58
Fences and walls	1,000.00	2,000.00	255.00	6,535.50	294.08	1,500.00	500.00	2,532.66	2,000.00	....	1,073.00	125.00	17,815.24
Cranes, shears, and derricks	3,000.00	3,500.00	....	....	1,035.00	500.00	7,000.00	2,166.00	1,800.00	....	....	30.00	19,031.00
Furnaces, forges, heating apparatus, etc.	3,000.00	2,100.00	....	9,780.00	565.60	5,000.00	800.00	414.27	1,600.00	....	....	....	23,259.87
Tracks and scales	1,000.00	2,300.00	....	894.00	1,634.40	5,500.00	1,500.00	870.50	3,000.00	....	....	50.00	16,748.90
Water and gas works	5,600.00	1,000.00	....	10,600.00	....	2,500.00	1,800.00	830.00	3,000.00	....	312.40	....	25,642.40
Dredging and mowing	....	2,000.00	....	11,000.00	....	2,000.00	....	15,720.00	....	....	....	....	30,720.00
Dry-docks	*10,000.00	2,000.00	....	785.50	....	....	7,500.00	10,118.00	11,222.00	....	....	....	41,625.50
Miscellaneous repairs	5,000.00	3,000.00	....	5,500.00	....	....	5,000.00	1,418.86	4,500.00	$1,000.00	....	150.00	25,568.86
Dykes	....	....	....	....	30,080.88	....	....	....	....	....	....	....	30,080.88
Total	64,600.00	98,062.00	3,847.05	242,224.25	50,081.28	49,500.00	94,349.86	77,104.35	70,750.79	1,000.00	4,778.10	930.00	756,630.68

* Wooden balance dock.

No. 7.—*Detailed estimate for "general maintenance" received from yards and stations for the fiscal year ending June 30, 1892.*

Objects.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.	Norfolk.	Pensacola.	Mare Island.	Key West.	Port Royal.	Total.
Freight and transportation	$50.00	$200.00	$50.00	$1,500.00	....	$50.00	$100.00	$25.00	$3,000.00	$10.00	$100.00	$5,085.00
Printing, stationery, and advertising	300.00	350.00	262.13	1,000.00	$28.80	500.00	500.00	232.00	300.00	....	100.00	3,572.93
Books, maps, models, and drawings	150.00	100.00	13.00	1,750.00	6.50	50.00	1,000.00	10.00	100.00	....	....	3,179.50
Purchase and repair of fire-engines	500.00	....	699.40	5,420.00	....	500.00	850.00	1,434.50	300.00	....	250.00	9,953.90
Machinery of every description and patent rights	1,000.00	1,000.00	....	7,000.00	1,867.00	500.00	7,500.00	195.00	500.00	....	....	19,562.00
Repairs on steam-engines and attendance on same	1,500.00	500.00	....	4,450.00	1,230.20	2,213.62	6,680.00	563.00	6,000.00	....	....	23,136.82
Purchase and maintenance of oxen and horses, pay of hired teams, etc	6,750.00	7,000.00	2,332.50	20,979.50	9,545.00	5,000.00	14,415.00	1,993.70	8,000.00	....	450.00	76,465.70
Carts, timber-wheels, and tools of every description	5,000.00	2,000.00	960.00	7,156.00	5,155.76	2,500.00	9,500.00	608.00	500.00	....	200.00	33,579.76
Postage on letters on public service and telegrams	25.00	50.00	238.04	600.00	20.00	20.00	25.00	....	500.00	....	....	1,478.04
Furniture for Government houses and offices in navy-yards	1,000.00	1,200.00	150.00	5,600.00	1,396.00	2,500.00	7,000.00	1,398.50	3,000.00	....	500.00	23,744.50
Coal and other fuel for yards and docks purposes	800.00	3,500.00	291.00	5,545.00	1,660.00	2,000.00	1,760.00	209.00	3,000.00	....	400.00	19,165.00
Candles, oil, and gas	1,000.00	1,500.00	224.00	8,534.00	195.00	1,000.00	2,650.00	375.00	4,000.00	173.00	200.00	14,851.00
Cleaning and clearing up yards and care of buildings	2,500.00	3,000.00	1,043.05	14,352.00	4,200.00	5,500.00	5,760.00	1,659.48	4,000.00	250.00	547.00	42,811.53
Attendance on fires, lights, fire-engines, and apparatus	3,500.00	2,500.00	....	6,707.60	4,200.00	3,205.12	3,676.00	2,425.76	2,500.00	....	....	28,714.48
Incidental labor, not chargeable to other appropriations	2,500.00	2,000.00	732.00	5,304.00	3,900.00	500.00	6,000.00	....	3,000.00	....	....	23,936.00
Water tax	....	3,000.00	....	8,000.00	....	....	2,500.00	156.80	5,000.00	73.00	....	18,729.80
Tolls and ferriage	25.00	....	25.00	200.00	....	....	50.00	60.00	3,200.00	....	....	3,560.00
Pay of watchmen	3,800.00	4,000.00	3,111.00	9,835.00	7,300.00	....	11,504.80	7,504.40	3,200.00	1,395.00	....	51,670.20
Flags, awnings, and packing-boxes	100.00	100.00	40.82	378.00	701.20	100.00	232.50	133.23	200.00	15.00	50.00	2,050.75
Rent of landings	....	....	100.00	....	....	....	....	....	....	....	....	100.00
Total	30,500.00	32,000.00	10,271.94	109,331.10	41,405.46	26,138.74	81,703.30	18,983.37	50,300.00	1,916.00	2,797.00	405,346.91

No. 8.—*Report showing amount expended during the fiscal year ending June 30, 1890, from appropriations pertaining to the Bureau of Yards and Docks, for civilians employed on clerical duty or in any other capacity than ordinary mechanics and workingmen, at the several navy-yards, and submitting estimates for such civilian employés for the fiscal year 1892, in compliance with the third section of naval appropriation act, approved January 30 1885 (for a year of 365 days).*

Navy-yards and rating, and rate of pay.	Amount paid to civilians employed during the fiscal year ending June 30, 1890.	Estimates for civilian employés for the fiscal year ending June 30, 1892.	
		Rate of pay.	Amount.
PORTSMOUTH, N. H.			
Clerk, at $1,400 per annum	$1,400.00	$1,400.00	$1,40
Mail messenger, at $2 per diem *	600.00	2.00	73
Messenger at $600 per annum	600.00	600.00	600.00
Foreman laborer and head teamster at $4 per diem*	1,460.00	4.00	1,460.00
Pilot at $3 per diem*	1,095.00	3.00	1,095.00
Janitor at $600 per annum	600.00	600.00	600.00
Foreman mason, when required, at $4.50 per diem (submitted)		4.50	1,408.50
Total	5,755.00		7,293.50
BOSTON, MASS.			
Clerk, at $1,400 per annum	1,399.94	1,400.00	1,400.00
Foreman laborer, at $4 per diem	1,232.00	4.00	1,25
Messenger to commandant, at $1.76 per diem	550.88	1.76	55
Messenger, at $1.76 per diem	550.88	1.76	55
Mail messenger, at $2 per diem*	600.02	2.00	73
Writer, at $900 per annum		900.00	90
Total	4,333.72		5,383.7
BROOKLYN, N. Y.			
Clerk, at $1,400 per annum	1,400.01	1,400.00	1,400.00
Writer, at $1,017.25 per annum	994.95	1,017.25	1,
Two masters of tugs, at $1,500 each per annum (one submitted)		1,500.00	3,000.00
Two writers, at $900 each per annum		900.00	1,800.00
Writer, at $900 per annum (submitted)		900.00	90
Foreman laborer, at $4.50 per diem	1,401.75	4.50	1,40
Mail messenger, at $2 per diem*	600.00	2.00	73
Two messengers, at $2.25 each per diem	1,408.50	2.25	1,408.50
Draughtsman, at $5 per diem	1,565.00	5.00	1,565.00
Quarterman, at $3 per diem		3.00	00
Superintendent of teams or quarterman, at $4 per diem	1,246.00	4.00	1,
Messenger to commandant, at $2.25 per diem*	821.25	2.25	821
Draughtsman to civil engineer in charge of docks, at $5 per diem	1,555.00		
Draughtsman to board of improvement, at $5 per diem	1,105.00		
Writer to board of improvement, at $3.04 per diem	471.20		
Two rodmen to board of improvement, at $2.48 each per diem	483.16		
Draughtsman to board, at $5 per diem	745.00		
Quarterman joiner, at $3.76 per diem	1,139.12		
Quarterman wharf builder, at $3.52 per diem	279.96		
Total	15,215.90		16,241.50
SACKETT'S HARBOR, N. Y.			
Ship-keeper, at $1 per diem *	365.00	1.00	
LEAGUE ISLAND, PA.			
Clerk, at $1,400 per annum	1,400.00	1,400.00	1,400.00
Writer and telegraph operator, at $1,000 per annum		1,000.00	1,000.00
Messenger, at $2 per diem	626.00	2.00	626.00
Foreman laborer, at $4 per diem	1,252.00	4.00	1,252.00
Draughtsman, at $5 per diem (submitted)	1,487.50	5.00	1,565.00
Sub-inspector, at $3.50 per diem	1,074.50		
Sub-inspector, at $3.50 per diem	1,078.00		
Leveler at $3.84 per diem	1,069.44		
Rodman, at $2.56 per diem	788.48		
Total	8,775.92		5,

* Including Sundays

No. 8.—*Report showing amount expended during the fiscal year ending June 30, 1890, from appropriations pertaining to the Bureau of Yards and Docks, etc.*—Continued.

Navy-yards and rating, and rate of pay.	Amount paid to civilians employed during the fiscal year ending June 30, 1890.	Estimates for civilian employés for the fiscal year ending June 30, 1891.	
		Rate of pay.	Amount.
WASHINGTON, D. C.			
Clerk, at $1,400 per annum	$1,399.99	$1,400.00	$1,400.00
Messenger, at $2 per diem	532.40	2.00	626.00
Foreman laborer, at $4 per diem	1,236.00	4.00	1,252.00
Electrician to care for, and be in charge of, electric plant for electric lighting and fire alarm (submitted)	....	1,017.25	1,017.25
Total	3,168.39	....	4,295.25
NORFOLK, VA.			
Clerk, at $1,400 per annum	1,388.43	1,400.00	1,400.00
Writer, at $1,017.25 per annum	1,017.16	1,017.25	1,017.25
Writer, at $1,000 per annum	....	1,000.00	1,000.00
Foreman laborer, at $4 per diem	1,252.00	4.00	1,252.00
Mail messenger, at $2 per diem *	730.00	2.00	730.00
Two messengers, at $2 each per diem	1,181.00	2.00	1,252.00
Pilot, at $2.26 per diem	700.60	2.26	707.38
Draughtsman, at $5 per diem (submitted)	....	5.00	1,565.00
Total	6,269.19	....	8,923.63
PENSACOLA YARD FLA.			
Clerk, at $1,200 per annum	1,200.00	1,200.00	1,200.00
Mail messenger, at $2 per diem*	600.00	2.00	730.00
Total	1,800.00	....	1,930.00
MARE ISLAND, CAL.			
Clerk, at $1,400 per annum	1,400.00	1,400.00	1,400.00
Writer, at $1,017.25 per annum	1,017.25	1,017.25	1,017.25
Foreman mason, at $6 per diem	1,794.75	6.00	1,878.00
Foreman laborer, at $5.50 per diem	1,710.50	5.50	1,721.50
Pilot, at $4.80 per diem	1,502.40	4.80	1,502.40
Draughtsman, at $5 per diem	1,545.00	5.00	1,565.00
Mail messenger,† at $2.74 per diem*	1,000.10	2.74	1,000.10
Messenger, at $2 per diem	688.60	2.00	626.00
Messenger and lamp-lighter, at $2 per diem	687.50	2.00	626.00
Bell-ringer, at $2.26 per diem	707.38	....	....
Electrician for electric plant (submitted)	....	....	1,500.00
Total	12,053.48	....	12,836.25
KEY WEST, FLA.			
Messenger, at $600 per annum	....	600.00	600.00
NEW LONDON, CONN.			
Mail messenger, at $600 per annum (submitted)	....	600.00	600.00

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* Including Sundays.

† The duties of the mail messenger at this yard are very arduous, as well as responsible, and in view of the high wages paid on this coast, common laborers $2.16 and special laborers $3.04, the pay estimated for this important service, viz, $2.74 per diem, is no more than a just compensation. The mail messenger here is really a postmaster, in addition to messenger, as he receives, assorts, and distributes the mail, and is employed for more than twelve hours a day.

Recapitulation of expenditures for certain employés for fiscal year ending June 30, 1890, *and estimates for the same fiscal year ending June* 30, 1892, *per act approved January* 30, 1885.

Navy-yards and stations.	Expenditures 1889-'90.	Estimates 1891-'92.
Portsmouth, N. H	$5,755.00	$7,293.50
Boston, Mass	4,833.72	5,383.76
New London, Conn	....	600.00
Sackett's Harbor, N. Y	365.00	365.00
Brooklyn, N. Y	15,215.90	16,241.50
League Island, Pa	8,775.92	5,843.00
Washington, D. C	3,168.39	4,295.25
Norfolk, Va	6,269.19	8,923.63
Pensacola, Fla	1,800.00	1,930.00
Mare Island, Cal	12,053.48	12,836.25
Key West, Fla	....	600.00
Total	57,736.60	64,311.89

No. 9.—*Statement of the appropriations for the Bureau of Yards and Docks for the fiscal year ending June* 30, 1890, *showing the amounts expended under each specific head of appropriation and the balances remaining unexpended June* 30, 1890, *as required by section* 429 *Revised Statutes.*

Appropriation for general maintenance, 1890	$165,000.00
Expended from July 1, 1889, to June 30, 1890	143,121.36
Balance on hand July 1, 1890	21,878.64
Which will be entirely absorbed.	
Appropriation for repairs and preservation, 1890	225,000.00
Expended from July 1, 1889, to June 30, 1890	203,347.47
Balance on hand July 1, 1890	21,652.53
Which will be entirely absorbed.	
Appropriation, civil establishment, 1890	46,754.60
Expended from July 1, 1889, to June 30, 1890	46,536.79
Balance on hand July 1, 1890	217.81
Which will revert to the Treasury.	
Appropriation for contingent, 1890	20,000.00
Expended from July 1, 1889, to June 30, 1890	9,449.26
Balance on hand July 1, 1890	10,550.74
The most of which will revert to the Treasury.	
Appropriation for Naval Home, 1890	68,517.00
Expended from July 1, 1889, to June 30, 1890	57,440.91
Balance on hand July 1, 1890	11,076.09
Of which a small amount will revert to the Treasury after liabilities are paid.	
Appropriation, navy-yard, Boston, water-pipes	32,000.00
Expended from July 1, 1889, to June 30, 1890	32,000.00
Appropriation, navy-yard, Boston, officers' quarters	28,610.00
Expended from July 1, 1889, to June 30, 1890	25,694.92
Balance	2,915.08
Which will be entirely absorbed.	

Appropriation, navy-yard, Brooklyn, N. Y.:

Repairs to building on Cob Dock	$5,000.00
Boiler-shop and wing to machine-shop	68,340.47
Quarters for civil engineer	10,000.00
Reconstructing building No. 7	60,000.00
	143,340.47
Expended from July 1, 1888, to June 30, 1890	143,339.95
Balance on hand July 1, 1890	.52

Which will be entirely absorbed.

Appropriation, navy-yard, Brooklyn, N. Y.:

Improving Whitney basin	40,000.00
Railroad throughout the yard	15,000.00
	55,000.00
Expended from July 1, 1889, to June 30, 1890	49,741.62
Balance on hand July 1, 1890	5,258.38

Which will be entirely absorbed.

Appropriation, for timber dry-docks, navy-yards, Brooklyn, N. Y. and Norfolk, Va	1,100,000.00
Expended from July 1, 1888, to June 30, 1890	1,099,757.36
Balance on hand July 1, 1890	242.64

Which will be entirely absorbed.

Appropriation, navy-yard, League Island, Pa.:

Improvement of grounds and construction of protection wall	75,000.00
Expended from July 1, 1888, to June 30, 1890	40,100.60
Balance on hand July 1, 1890	34,899.40

Which will be entirely expended.

Appropriation, navy-yard, League Island, Pa.:

Timber dry-dock	550,000.00
Expended from July 1, 1888, to June 30, 1890	338,163.57
Balance on hand July 1, 1890	211,836.43

Which will be expended in completing the dock.

Appropriation, navy-yard, League Island, Pa.:

Landing wharf foot of Fifteenth street (reappropriated)	26,416.40
Dredging and filling in (no expenditure for this amount)	75,000.00
Balance on hand July 1, 1890	101,416.40

Appropriation, navy yard, Washington, D. C.:

Railroad track, with switches and turn-outs	15,000.00
Expended from July 1, 1889, to June 30, 1890	14,983.75
Balance on hand July 1, 1890	16.25

Appropriation, navy-yard, Norfolk, Va.:

Building, by contract, two officers' quarters	16,000.00
Expended from July 1, 1889, to June 30, 1890	4,346.95
Balance on hand July 1, 1890	11,653.05

Which will be entirely expended.

Appropriation, navy-yard, Norfolk, Va.:

Iron and steel shop	75,000.00
Railroad extension	10,000.00
Boiler-shop extension	14,448.00
Water system	15,000.00
	114,448.00
Expended from July 1, 1888, to June 30, 1890	111,705.69
Balance on hand July 1, 1890	2,742.31

Which will be entirely absorbed.

Appropriation, navy-yard Mare Island, Cal., 1887:

Granite dry dock	$191,595.00
Expended from July 1, 1886, to June 30, 1890	187,903.21
Balance on hand July 1, 1890	3,691.79

Which will be entirely absorbed.

Appropriation, navy-yard Mare Island, Cal.:

Continuing work on granite dry-dock	80,000.00
Expended from March 2, 1889, to July 1, 1890	70,648.39
Balance on hand July 1, 1890	9,351.61

Which will be entirely absorbed.

Appropriation, navy-yard Mare Island, Cal.:

Cisterns	46,364.00
Finishing boiler and machine shop	4,200.00
Extending wharf	30,000.00
Crane scow	7,000.00
Pile-driver	5,000.00
Swinging crane	4,000.00
Mud scow	4,500.00
	101,064.00
Expended from July 1, 1888, to June 30, 1890	100,748.50
Balance on hand July 1, 1890	315.50

Which will be entirely absorbed.

Appropriation, navy-yard, Mare Island, Cal.:

Iron plating shop	5,755.40
Roads along water front and about shops	5,000.00
Extension of quay wall	55,000.00
	65,755.40
Expended from July 1, 1889, to June 30, 1890	23,805.10
Balance on hand July 1, 1890	41,950.30

Which will be entirely absorbed.

Appropriation, navy-yard, Brooklyn, 1887:

For repairing and preserving granite dry-dock	100,000.00
Expended from September 1, 1886, to June 30, 1890	99,764.61
Balance on hand July 1, 1890	235.39

Which has since been entirely absorbed.

Appropriation, navy-yard, Boston, Mass.:

Rebuilding floating gate	31,000.00
Expended from July 1, 1887, to June 30, 1890	13,439.69
Balance on hand July 1, 1890	17,560.31

Which will revert to the Treasury.

Appropriation, adjustable stern dock, for naval station, Key West, Fla.	30,000.00
Expended from July 1, 1889, to June 30, 1890	27,000.00
Balance on hand July 1, 1890	3,000.00

Which will be entirely absorbed.

Appropriation, electric lighting of navy-yards	60,600.00
Expended from July 1, 1889, to June 30, 1890	16,607.75
Balance on hand July 1, 1890	43,392.25

Appropriation, naval station, Key West, Fla.:

For two houses, officers' quarters	8,000.00
Expended from July 1, 1889, to June 30, 1890	6,740.10
Balance on hand July 1, 1890	1,259.90

Which will be entirely absorbed.

Appropriation, commissions on new navy-yards and dry-docks, Gulf of Mexico and South Atlantic and Pacific coasts	$15,000.00
Expended from September 7, 1888, to June 30, 1890	10,521.77
Balance on hand June 30, 1890	4,479.23

Which will be quite, if not entirely, absorbed.

Appropriation naval station and coaling depot, Port Royal, S. C.:

Fencing	$228.00	
Artesian well	1,000.00	
Boat-house	400.00	
Officers' quarters	2,000.00	
		3,628.00
Expended from July 1, 1888, to June 30, 1890		3,628.00

Abstract and statement of offers received for contracts for improvements, materials, and services coming under the cognizance of the Bureau of Yards and Docks, as required by section 429, Revised Statutes.

Offers for installing an electric lighting plant, at Washington navy-yard, D. C., under advertisement dated July 9, 1889:

Brush Electric Company	*$13,975.00
Schuyler Electric Company	13,750.00
Fort Wayne Jenney Company	20,940.00
Thomson-Houston Company	20,600.00
Excelsior Electric Company	20,510.00

Offers for construction of roof and iron work, building No. 28, navy-yard, Brooklyn, N. Y., under advertisement dated August 1, 1889:

Howel & Saxton	$26,760.00
H. B. Gibbs, treasurer	23,593.00
Wm. H. Brown, president	*21,472.54
Post & McCord	25,900.00
Milliken Bros	24,987.00

Offers for rebuilding officers' quarters L, M, N, and O, at navy-yard, Boston, Mass., under advertisement dated August 10, 1889:

James McNeal	$24,750.00
Kelly & McKinnor	27,777.00
Wm. Pray	27,997.00
John B. Wilson	28,345.00
C. L. Welden	29,300.00
Barker & Dodge	†26,947.00
Wm. S. Weston	37,777.00
Howard Cone & Co	‡25,400.00

Offers for construction of an iron and steel shop at navy-yard, Norfolk, Va., under advertisement, dated August 28, 1889:

McCarthy & Baldwin	$85,972.00
Holtzclaw Bros	*77,204.00
Haugh, Ketcham & Co	77,204.50
H. H. Edgerton & Co	82,129.00
Milliken Bros	‡26,715.19

Offers for construction of 400 feet protection wall at navy-yard, League Island, Pa., under advertisement dated September 10, 1889:

F. H. Smith	$118.00
John Jameson	133.00
Allen B. Rourke	96.60
McCarthy & Baldwin	99.94
Mundy & Mundy	123.00
Colin McLean	*83.73
J. E. Simpson & Co	138.00
T. P. Smart	123.00
H. T. McTague	129.00

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* Accepted. † Less item "A," $5,636. ‡ Informal.

Offers for construction of officers quarters at naval-station, Key West, Fla., under advertisement dated December 14, 1889:

Wm. R. Kerr	$8,000.00
R. A. Robbins	*7,489.00
Scott, McDermott & Higgs	7,915 00
Gaspar del Pino	7,600.00

Offers for constructing officers quarters at navy-yard, Norfolk, Va., under advertisement dated June 15, 1890:

Edward Hart	$19,897.50
Jno. E. West	15,081.32
Jno. Shehan	15,300.00
W. J. Brent	13,9[illegible]8.00
Geo. H. Morrow	*13,399.00
Wm. Rothwell	16,856.00
W. R. Taylor	17,182.00

Offers for construction of boiler-room and foundation for chimney for iron and steel shop, navy-yard, Norfolk, Va., under advertisement dated April 17, 1890:

Armstrong & Crowther	$3,900 00
Holtzclaw Bros	4,255.00
Hutchings & Moody	8,500.00
W. J. Brent	*3,591.00
John Shehan	3,900.00
Geo. W. Morrow	4,909.00
Wm. Rothwell	5,177.00

Offers for constructing sea-wall at naval station, Key West, Fla., under advertisement dated April 19, 1890:

A. A. Brooks	$1,470.00
Thomas Hayden	5,400,00
E. A. Van Pfister	†1,350.00
Primas Daiz	*5,066.00
McDermott & Higgs	5,562.50

Offers for repairs to steam fire-engine "Dupont," at navy-yard, Portmouth, N. H., under advertisement dated May 22, 1890:

La Franc Fire Engine Company	$1,750.00
Manchester Locomotive Works	1,850,00
Forsaith Machine Company	*1,235.00

Offers for dredging at navy-yard, Brooklyn, N. Y., under advertisement dated June 2, 1890:

Wm. H. Beard	*$20,700.00
P. Sandford Ross	23,850.00
Atlantic Dredging Company	21,600.00

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* Accepted. † Informal.

REPORT

OF

THE CHIEF OF THE BUREAU OF EQUIPMENT.

NAVY DEPARTMENT, BUREAU OF EQUIPMENT,
Washington, D. C., October 15, 1890.

SIR: I have the honor to submit the following report of the operations of this Bureau and its subordinate offices for the fiscal year ending June 30, 1890, together with estimates for the support of the Bureau during the fiscal year to end June 30, 1892; the annual reports of the Superintendent of the Naval Observatory and of the Superintendent of the Nautical Almanac, the latter two reports accompanied by estimates, respectively, for the support of the Naval Observatory and the Nautical Almanac Office, and for personnel and contingent expenses of the new Naval Observatory for the fiscal year to end June 30, 1892; and the reports of the Naval Inspector of Electric Lighting and the Superintendent of Compasses.

During the past year sixty-five vessels have been either wholly or partly equipped under this Bureau, at an expenditure of labor and material, part of which latter was on hand and part purchased, of $593,986.62.

Coal for ship's use and for the equipment shops at shore stations, to the amount of 66,594 tons, was purchased at a cost, including the expense of freight, labor, etc., of $451,693.74.

Hemp for the manufacture of cables, towlines and rope, to the amount of 101 tons, was purchased at an expenditure of $26,974.68.

The ropewalk and the equipment shops at the Boston navy-yard have to a large extent supplied rope, chain-cables, anchors, galleys, etc., to meet the wants of the service, and the sail-lofts at that station and at the New York, Norfolk, and Mare Island navy-yards have been busy the greater part of the time with sail and other canvas work to supply new ships and to replace articles worn out in service.

ELECTRIC LIGHTS AND SIGNALS.

The lighting of ships of war by electricity, which was inaugurated by this Government, has now become so essential that no warship is considered complete which is not so lighted. During the year substantial progress has been made in the development and advancement of the system which is being employed in the new ships, and progress abroad has been critically noted. Electric lighting plants have been installed on board seven vessels, and the work of installation is actively progressing upon four others.

Special attention has been given during the year to the subject of means of interior communication on shipboard, and a telephone system is soon to be added experimentally to other devices in use on board one of the new cruisers.

Night signaling by electricity has also been and is still actively under consideration, and it is believed that a system will have been devised in the near future which will meet the increasing necessity of the service in this respect. The great importance of an adequate method of communication at night between ships of a squadron or fleet makes necessary the utmost care in the consideration of the subject.

The annual report of Commander John S. Newell, Naval Inspector of Electric Lighting, is appended.

COMPASS WORK.

The placing and adjustment of compasses on board the new steel ships is a subject of growing importance to the service. The safety of the vessel and her success in emergencies obviously depend, to a great extent, on the correct performance of this most important instrument of navigation.

In the line of this work two officers on duty in this Bureau, Lieut. S. W. B. Diehl and Ensign John Gibson, have designed and patented within the year an important improvement in compensating binnacles, and a contract has been made with a firm of established reputation for the construction of ten of these binnacles for use on board the new vessels. The inventors have generously dedicated to the public service and to the citizens of the United States the result of their skill as embodied in this instrument, and therefore claim no royalty for its use. A description and illustrations of the binnacle appear in the report of the Superintendent of Compasses. This report shows the growth of the compass work of the service, and contains interesting discussion of the difficulties which arose in placing the steering-compass of the U. S. S. *Baltimore*, and vessels of her class, and suggests most pertinently that more careful consideration should be given to the compass and its surroundings in the planning of ships.

THE NAVAL OBSERVATORY.

The report of the Superintendent of the Naval Observatory for the year shows that astronomical work of exceptional interest was performed. The reduction of observations is still considerably in arrear, owing to an inadequate computing force.

The Bureau has adopted the policy of concentrating at the Naval Observatory all instruments of navigation not in use, excepting compasses and such instruments as it may be found expedient to keep in store at the different stations, and within the year a considerable number of instruments of the various kinds, including chronometers, sextants, octants, spy-glasses, binocular glasses, and barometers, have been called in from the stations and from ships having on board an excess over the allowance. This plan has already proved to be beneficial, as instruments out of order can be adjusted or repaired with greater readiness at a common depot where the best facilities are at hand to be applied by skilled officers and other persons there employed.

Action has recently been taken looking to the purchase, after competitive trial, of sixteen new chronometers of American make to meet the requirements of the service. Many of the chronometers now in use are of foreign make, old and more or less unreliable, and it is the intention of the Bureau to call in these instruments gradually, and supply in their place new ones of domestic manufacture. The competitive trial referred to is to begin December 1, proximo, at the Naval Observatory.

The experience of the Bureau in selecting instruments for purchase by this means has been most satisfactory, as the keen competition among makers, and the value evidently attached by them to Government approval, lead them to enter their best products, which obviously affords a choice field from which to select.

The practice has been continued of admitting visitors for a limited time two nights in the week to view the heavens through the 9.6-inch equatorial, this being as often as they can be received without interfering with astronomical work. Despite the frequent obscurations due to cloudy weather, more than 2,500 people, largely visitors from a distance, have been afforded during the year this profound and novel pleasure.

It is expected that the institution will be transferred to the new observatory buildings some time in the summer of 1891.

COMMERCIAL TIME SERVICE.

A most notable feature in the affairs of the Bureau, in connection with the extensive telegraphic time service which has become an established and apparently an indispensable commercial factor centering at the Naval Observatory, has been a concerted attack upon the prevalent system by a large number of observatories located throughout the United States, the object being to break up the system in order that time, which is now furnished without cost from the Naval Observatory, may be distributed and charged for at these minor observatories as a means contributing to their maintenance. It is held by the petitioners that this system should be discontinued by the Government to encourage private astronomical institutions of the United States. The subject has been strongly and urgently presented by the directors of these institutions, and detail considerations of a most interesting character enter into the discussion. A recommendation has been made in view of the great importance of the present system to commerce throughout the country, on the one hand, and of the strong case presented by the petitioning astronomers on the other, that the subject be referred to a commission which shall broadly represent business and scientific interests, for examination and report.

NEW NAVAL OBSERVATORY.

Work on the new naval observatory has not progressed satisfactorily from a variety of causes, some natural and unavoidable, such as excessive rains, the destruction of the Chesapeake and Ohio Canal, by which material was received, and the wrecking of a vessel laden with material; and some which, in the opinion of the Bureau, should have been avoided, such as the supplying of material which was rejected as not up to standard quality, business complications between the contractors and sub-contractors which delayed unreasonably the delivery of material, and a disposition on the part of the contractors to be sluggish at times in complying with the requirements of the architect under provisions of the contract. It is considered probable that the new buildings will be ready for occupancy in the early part of the fiscal year 1891–'92. Attention is invited to the supplementary report of the Superintendent of the Naval Observatory on this subject, containing recommendations with reference to the laying out of grounds, the construction of quarters, the equipment of the new institution, etc.

NAUTICAL ALMANAC OFFICE.

The Nautical Almanac Office has continued, in addition to its current business, its important work in mathematical astronomy on lines laid down by Professor Simon Newcomb ten years ago, having in view a systematic determination of the constants of astronomy from the best existing data, a reinvestigation of the theories of the motions of celestial bodies, and the preparation of tables, formulæ, and precepts for the construction of ephemerides and for other applications of the results. An incident of the year was the publication, under the title Hill's Theory of Jupiter and Saturn, of volume 4 of the series of "Astronomical Papers for the American Ephemeris," which represents seven and one-half years of labor by Mr. Hill, with aid for a part of this time of two assistants. It is held to be a work of originality and merit.

THE ECLIPSE EXPEDITION.

By authority of act of Congress, approved March 2, 1889, a scientific expedition, primarily to observe the eclipse of the sun which occurred December 22, 1889, was dispatched by the Bureau, acting under instructions from the Department, to the west coast of Africa in the immediate charge of Professor David P. Todd, of Amherst College. The expedition was carried by the U. S. S. *Pensacola*, which sailed from New York for St. Paul de Loando and Cape Ledo, October 16, 1889. At the latter point satisfactory observations of the phases were made, but those of the corona, the main object of the expedition, were unsuccessful, owing to the intervention of clouds. Instantaneous photography was employed, and 110 exposures were made, a considerable portion of which, it is understood, will produce prints of value to astronomical science. A scientific staff drawn from the Smithsonian Institution, the Coast and Geodetic Survey, the Signal Office of the War Department, and from various educational institutions of the United States, represented astronomy, geodesy (including terrestial magnetism), natural history, anthropology, and linguistics, and secured a great volume of observations and collections, which can not fail to prove interesting and valuable to the sciences to which they relate when they shall have been reduced to results.

The expedition returned to New York, May 23, 1890.

EQUIPMENT OF VESSELS.

I deem it my duty to renew former statements and recommendations with reference to an additional allowance of money to equip ships of war. There is a gradually increasing demand from the service due to the placing in commission of ships of modern type, which require not only much more fuel than the old ships, but whose equipments are all of a more expensive character than those formerly in use; and, with this consideration in view, the Bureau has estimated that $1,000,000 will be necessary for the general purposes comprised under the heading "Equipment of vessels," which includes the purchase, handling, and shipment of coal. The amount stated is $100,000 more than the appropriation for the current year.

Very respectfully,

GEORGE DEWEY,
Chief of Bureau.

The SECRETARY OF THE NAVY.

Statement of sales of condemned materials under cognizance of Bureau of Equipment and Recruiting during fiscal year ending June 30, 1890, showing the materials sold, the parties buying the same, and the amount realized therefrom.

Date of sale.	Where sold.	Materials sold.	Purchasers.	Amount realized.
1889. Sept.	Norfolk, Va	Anchor hooks, etc	J. Dreifus	$7.50
	do	Fire extinguisher, etc	Winternetz & Bro	33.00
	do	Hose and hose pipes	J. W. Woodman	50.00
	do	Hammocks, bags, etc	L. Foreman	7.00
	do	Hooks, lines, calls, etc	F. Bannerman	4.75
	do	Cork jackets, etc	Walsh & Son	9.00
	do	Heating and drying stoves	F. Bannerman	2.00
	do	Hand and leg irons, chisels	do	5.25
	do	Oil-cloths, curtains, etc	R. Morris	15.00
	do	Table-covers, mats, etc	W. H. Codd	5.50
	do	Door, lattice, and bunk curtains, etc.	do	15.00
	do	Cooking utensils	Nolan Bros	1.75
	do	Plated ware	P O'Connor	5.00
	do	China ware	W. H. Codd	1.00
	do	Glass-ware	do	1.50
	do	Kettles, assorted	J. W. Woodman	5.60
	do	Palms, harpoons, etc	J. McHugh	5.00
	do	Sails, needles, shears, etc	C. Freedman	3.25
	do	Looking-glasses, etc	do	6.00
	do	Pans, dish covers, etc	L. J. Foreman	1.25
	do	Tape lines, knives, etc	do	.25
	do	Clothes-bags, carpets, etc	J. Dreifus	9.00
	do	Boat cushions, etc	L. F. Davis	35.50
	do	Shakings	L. F. Davis	128.40
	do	Manilla rigging	Kane Bros	80.85
	do	Launch awnings	L. F. Davis	15.75
	do	Tarpaulins, etc	do	6.25
	do	Boat arm curtain, etc	Walsh & Co	5.00
	do	Painted cloths	J. Dreifus	8.50
	do	Manilla junk, 2,660 pounds	Kane Bros	114.38
	do	Manilla tow-line, 2,400 pounds	M. J. Ash	122.40
	do	Hemp rigging, 1,800 pounds	L. F. Davis	81.00
	do	Manilla rigging, 2,600 pounds	Kane Bros	123.50
	do	Hemp hawser, 900 pounds	M. J. Ash	51.75
	do	Manilla junk, 675 pounds	Kane Bros	23.97
	do	Rigging, 3,250 pounds	do	130.00
	do	Manilla hawser	do	54.62
	do	Electric bells	Wm. Scott	3.00
	do	138 pounds old brass, etc	J. W. Woodman	9.32
	do	Miscellaneous books	W. H. Codd	14.00
	do	Thermometers, etc	L. F. Davis	9.00
	do	Log. lead, etc	C. Freedman	4.25
	do	Binnacle, etc	F. Bannerman	76.00
	do	Cornet, horn, etc	S. Hecht	2.25
	do	Ensigns, flags, etc	J. Roney	40.00
	do	Log chips, reels	L. Foreman	4.25
	do	Compass, trumpets, etc	J. H. Dreyfus	8.50
	do	Miscellaneous lamps	J. McHugh	17.00
	do	Lanterns, etc	W. Woodman	8.50
	do	Signal lanterns, etc	J. Connery	18.50
	do	Standing lamps, etc	L. F. Davis	5.00
	Total			1,395.04
	Amount deposits forfeited			123.50
	Total			1,518.54
	Memorandum:			
	Receipts			1,518.54
	Expenses attending sales.			66.62
	Net proceeds			1,451.92
1890. June	Washington	10 horse blankets	T. Campbell	5.08
	do	1 fire extinguisher	J. Dreifus	2.10
	do	223 pounds cod-line	J. C. Abbey	18.12
	do	23 gross buttons	E. L. Fitzgerald	1.00
	do	1 baking pan	J. Dreifus	.10
	do	1 bedstead, iron, old	do	.25
	do	9 wash bowls	do	1.80
	do	14 dish covers	M. Stern	2.50
	do	1 carving fork	J. Dreifus	.10
	do	3 plated forks	do	.10
	do	1 plated cream-pitcher	do	.25
	do	1 plated sugar bowl	do	.25

*Statement of sales of condemned materials under cognizance of **Bureau of Equipment** and Recruiting during fiscal year ending June 30, 1889, etc.*—Continued.

Date of sale.	Where sold.	Materials sold.	Purchasers.	Amount realized.
1890. June	Washington	50 feet rubber hose	J. Driefus	$9.25
	do	1 scoop scale	M. Stern	.50
	do	1 spring balance scale	J. Dreifus	2.75
	do	1 steelyard scale	do	.15
	do	7 plated candlesticks	M. Stern	1.70
	do	5 candlestick globes	F. Bannerman	.10
	do	1 rope-laying machine	do	7.25
	do	51 parallel rulers	do	.50
	do	1 lot range boilers	T. J. Lawless	6.50
	do	1 galley, old	J. Dreifus	3.25
	do	Grate bars for range	Purvis & Son	26.00
	do	1 galley (incomplete)	do	20.50
	do	Soapstone linings	J. Dreifus	1.00
	do	25 tinder-box steels	F. Bannerman	.10
	do	Russian iron	J. Dreifus	5.06
	do	do	do	5.06
	do	1 galley (old)	do	19.65
	do	1,444 pounds galley plates	Purvis & Son	80.63
	do	628 pounds galley plates	do	30.71
	do	1 galley (old)	J. Dreifus	3.92
	do	Galley plates (unfinished)	Purvis & Son	5.00
	do	Lot spars, guys, chains	do	6.60
	do	1 staysail cover		
	do	2 hatch covers		
	do	1 cattle sling	J. Dreifus	9.00
	do	32 boat-awning bags		
	do	1 spring balance		
	do	1 rope-laying machine		
	do	8 kneading troughs	E. L. Fitzgerald	1.25
	do	32 water filters	Winternetz	3.50
	do	50 mast hoops	J. Dreifus	.50
		Total		300.94
	do	Lot galley and stop-cocks	Unknown (not claimed)	13.64
				314.58
1889. Oct.	Pensacola	Chain cables	Marine Railway Company	373.75
1890. Oct.	U. S. S. Enterprise	5,488 pounds junk	James Murphy	101.34

Schedule of offers for installing an incandescent electric-lighting plant on U. S. S. Petrel and Vesuvius.

[Bids opened July 29, 1889.]

PETREL.

Edison United Manufacturing Company	$13,190.00
Brush Electric Company	9,200.00
Thomson-Houston Electric Company *	8,300.00

VESUVIUS.

Edison United Manufacturing Company	6,570.00
Brush Electric Company	4,500.00
Thomson-Houston Electric Company *	3,350.00

Schedule of offers for installing an electric lighting plant on U. S. S. Vermont.

[Bids opened November 29, 1889.]

The E. S. Greeley & Company *	$5,653.36
Excelsior Electric Company	6,262.53
United Edison Manufacturing Company	6,807.00
Brush Electric Company (eastern office)	6,300.00
Brush Electric Company (Cleveland)	No amount stated.
Thomson-Houston Electric Company	7,493.00

Schedule of offers for installing electric-lighting plant on U. S. S. Miantonomok.

[Bids opened December 30, 1889.]

Thomson-Houston Electric Company	$17,474.00
The E. S. Greeley & Company	21,429.00
The United Edison Manufacturing Company	18,103.80
The Brush Electric Company *	16,337.98

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* Awarded.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the Bureau of Equipment, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
SALARIES.			
One chief clerk (act July 11, 1890; R. S., p. 70, sec. 416, pamphlet edition, p. 31); (increase of $200 submitted)	$2,000.00		
One clerk of class four (submitted)	1,800.00		
One clerk of class three (submitted)	1,600.00		
One clerk of class two (same acts)	1,400.00		
One clerk of class one (same acts)	1,200.00		
Two copyists at $900 each (same acts)	1,800.00		
One assistant messenger (same acts)	720.00		
One laborer (same acts)	660.00		
		$11,180.00	$7,580.00
EQUIPMENT OF VESSELS.			
For the purchase, transportation, storage, and handling of coal for ships of the Navy; hemp, wire, iron, and other materials for the manufacture of cordage, anchors, cables, galleys and their fittings; canvas for the manufacture of sails, awnings, and other canvas work; water for steam-launches; stationery for commanding and navigating officers of ships, equipment officers on shore and afloat, and for the use of courts-martial on board ships; foreign and local pilotage and towage of ships; services and materials in manufacturing, correcting, adjusting, and testing compasses on shore and on board ships; nautical and astronomical instruments and repairs to same; libraries for ships; professional books and papers; naval signals and apparatus, namely, signal lights, lanterns, and rockets; running lights, compass fittings, including binnacles, tripods, and other appendages; logs and other appliances for measuring ship's way and leads and other appliances for sounding; lamps and lanterns and other appendages for general use on board ships for illuminating purposes, and oil and candles used in connection therewith; bunting and other materials for making and repairing flags of all kinds; photographic instruments and materials; music and musical instruments; introducing and maintaining electric lights and interior signal communications on board ships, and for the purchase of all other articles of equipment at home and abroad and for the payment of labor in equipping vessels and manufacture of equipment articles in the several navy-yards (same act, pamphlet edition, p. 14.)		1,000,000.00	900,000.00
For installing an electric-lighting plant on U. S. S. *Lancaster* in addition to amount heretofore appropriated (submitted.)		10,000.00	10,000.00
CIVIL ESTABLISHMENT.			
Navy-yard, Portsmouth, N. H.:			
One clerk (same act, pamphlet edition, page 15)	1,200.00		
One clerk (same act pamphlet edition, page 15)	1,000.00		
Navy-yard, Boston, Mass.:			
One superintendent of ropewalk (same act, pamphlet edition, page 15)	1,875.00		
One clerk (same act, pamphlet edition, page 15)	1,400.00		
One clerk (same act, pamphlet edition, page 15)	1;300.00		
One writer (same act, pamphlet edition, page 15)	950.00		
Navy-yard, New York:			
One clerk (same act, pamphlet edition, page 15)	1,400.00		
One clerk (same act, pamphlet edition, page 15)	1,200.00		
One writer (same act, pamphlet edition, page 15)	1,000.00		
One storekeeper (same act, pamphlet edition, page 15)	900.00		
Navy-yard, League Island:			
One clerk (same act, pamphlet edition, page 15)	1,200.00		
Navy-yard, Norfolk:			
One clerk (same act, pamphlet edition, page 15)	1,200.00		
One clerk (same act, pamphlet edition, page 15)	1,200.00		
Navy-yard, Washington:			
One clerk (same act, pamphlet edition, page 15)	1,000.00		
Navy-yard, Mare Island:			
One clerk (same act, pamphlet edition, page 15)	1,200.00		
One clerk (same act, pamphlet edition, page 15)	1,000.00		
		19,025.00	19,062.00

Estimate of appropriations required for the fiscal year, etc.—Continued.

Detailed object of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amou appropri for the current f year endi June 30, 1
CONTINGENT.			
For freight and transportation of equipment stores, packing-boxes, and materials, printing, advertising, telegraphing, books, and models, postage on letters sent abroad; ferriage, ice, lighterage of ashes and emergencies arising under cognizance of the Bureau of Equipment unforeseen and impossible to classify (same act, pamphlet edition, p. 15)	....	$15,000.00	$10,0
INCREASE OF THE NAVY—EQUIPMENT OF NEW SHIPS.			
For supplying anchors, chain-cables, galleys, and fixtures, standing and running rigging, sails, awnings, and other canvas work, and other articles comprising the equipment outfit of ships; according to their type, viz, protected cruisers, Nos. 7, 8, 9, 10, 11, and 12; the *Monterey*; gun-boats 5 and 6; the harbor defense vessel known as the *Ammen Ram*; iron-clads *Puritan*, *Terror*, *Amphitrite*, and *Monadnock*; the steel practice cruiser provided for by the act of September 7, 1888, and the torpedo cruiser and torpedo-boat authorized by act of June 30, 1890	....	400,000.00	

REPORT OF SUPERINTENDENT OF NAVAL OBSERVATORY.

U. S. Naval Observatory,
Washington, September 9, 18

Sir: In compliance with the Bureau's instructions, dated Septem
1, 1890 (No. 3975), I have the honor to submit a report of the
tions of the Naval Observatory during the year ending June 30,

By order of the Honorable the Secretary of the Navy, I reporte
Capt. R. L. Phythian, U. S. Navy, on June 28, 1890, for duty as Supe
tendent of the U. S. Naval Observatory, as his relief.

The following is a brief statement of the work performed.

1. THE 26-INCH EQUATORIAL.

(Prof. Asaph Hall, U. S. Navy, in charge.)

Observations of a list of double stars were continued, as in pre
ing years. These stars are mostly those that have large orbital motio
and observations therefore are of value in determining their orb
Some other of the older stars of this class, which have not rapid motio
have also been observed, in order to connect our observations with th
made elsewhere, and thus to furnish a means of reducing the obse
tions to a common standard. A few new double stars were observ
but no attempt has ever been made here to discover new doubles
which many of the fainter magnitudes could be found. The new st
have generally been observed at the request of other astronomers.

As the last opposition of Saturn was very favorable for determin
the orbit of Iapetus, the outer satellite, a full series of observations
made. The conjunctions of some of the inner satellites of Saturn
the minor axis of the Ring were observed.

Observations of the satellites of Mars were made during the opp

ion of this planet, but owing to the low position of Mars it was found
racticable to record but a limited number of observations.

Ensign H. S. Chase, U. S. Navy, assistant to Professor Hall, has been
ployed in revising and reducing observations, in comparing obser-
ions of 1889 of Iapetus with the tables, and in computing an orbit of
e of the recent comets.

The reduction of observations of double stars from 1880 to 1891 is
well advanced. Observations of Iapetus should be reduced and dis-
ed; also observations of the satellite of Neptune. One computer
or one year is required to bring this work up to date.

II. THE TRANSIT CIRCLE.

(Prof. J. R. Eastman, U. S. Navy, in charge.)

The transit circle has been employed in observations of the sun,
oon, major and minor planets, and such stars as were necessary for
lock and instrumental corrections. Observations have been continued
n the list of stars for the U. S. Coast and Geodetic Survey.

The assistants on the transit-circle work were:

Assistant Astronomer A. N. Skinner, Assistant Astronomer A. Hall,
r. (since August 1, 1889), Computer William M. Brown, Computer
eorge A. Hill (since November 15, 1889), Computer Charles S. McCoy
since December 1, 1889), Computer A. S. Flint (until his resignation
November 1, 1889).

There were made 1,920 observations with the transit circle. Of this
umber, 47 were of the sun, 44 of the moon, 75 of the major planets, 16
f the minor planets, and 7 of Comet *a* 1890 (Brooks).

At the request of Carleton College Observatory, Northfield, Minn.,
lock signals were exchanged with that Observatory on October 16, 17,
nd November 5, to determine its longitude.

The continued reduction of the observing force has prevented any
rk on the German Zone.

The transit-circle work for 1885 is in print; the reductions for 1886
e nearly finished, and the apparent-place reductions for 1887 are more
han half completed, while those for the years 1888, 1889, and 1890 have
t been commenced.

From the foregoing it will be seen that the publications of the Obser-
tory are in arrears five years, and in order to reduce those observations
complete the work on hand for publication two additional compu-
ers are required.

By recommendation of a board of survey it is proposed to dismount
his transit circle about January 1, 1891, for extensive repairs and
lterations, at an estimated cost of $3,000, which will prevent its use
or about five months.

III. THE 9.6-INCH EQUATORIAL.

(Prof. Edgar Frisby, U. S. Navy, in charge.)

This instrument was used for observations of comets, minor planets,
nd occultations of stars by the moon. Eleven observations of minor
planets and forty-eight observations of comets were taken, and three
ccultations observed. The results of the observations of comets have
been published in Gould's Astronomical Journal The work is all re-
uced to date and can be prepared for the printer in a few days.

Two evenings in every week were set for the accommodation of ors for a view of the heavens through this telescope, and 1,735 perm were issued, exclusive of those issued by the Bureau.

IV. THE MERIDIAN TRANSIT INSTRUMENT.

(Lieut. B. W. Hodges, U. S. Navy, in charge.)

Observations have been made with this instrument on every cl night for corrections to the standard and other clocks. The cl have performed well. The telescope continued in good or brief interruption caused by the breaking of the threads o di phragm; these were immediately replaced, and in addition to the work, repeated observations of α Ursæ Minoris and other circ stars were taken and computations made until new equatorial inter were established. This work had not previously been do sin December, 1883. The machinery has generally been in go order. Some slight repairs and alterations, however, are de ne essary.

V. VARIABLE-STAR OBSERVATIONS.

(Assistant Astronomer H. M. Paul, in charge.)

Owing to Mr. Paul's additional duties as librarian, the time a for work upon variable stars has been quite limited, and the o va tions have been confined mostly to the new variable of short perio covered by him in the constellation *Antlia*, as referred to in the annual report. This star has been observed on thirty-two nights d the last opposition, and twenty-one of these give determinations o times of minimum phase with a greater or less degree of accuracy.

A preliminary announcement of the discovery, based upon the ob vations of the first opposition only, comparatively few in number, the period doubtful between two possible values of about 0.48^d 0.324^d; but the reductions have now progressed far enough to show t the period deduced by Mr. Chandler in the *Astronomical Journal*, L 190, viz: $7^h\ 46^m\ 48^s.0$, will be changed by only a very small fraction o a second, and the results will be soon be published in the *Journal*.

Mr. Chandler has assigned a letter to this star, and it will hereaf be known as *S Antliæ*. It is remarkable as having by far the shor period of any yet discovered, that of the next shortest, *U Ophiuchi*, be ing $20^h\ 7^m\ 41^s.6$.

VI. CHRONOMETERS AND TIME SERVICE.

(Lieut. Hiero Taylor, U. S. Navy, in charge.)

Since the general adoption of standard time the Observatory been dropping time balls at Newport, Wood's Holl, New York, Phi delphia, Baltimore, Fort Monroe, Savannah, and New Orleans at noon, 75th meridian time. This is done through the co-operation of the Western Union Telegraph Company, which each day suspends its business for the time used in sending the signals and allows the Observatory the free use of its lines. The signals, which begin at $11^h.\ 56^m.\ 45^s.$ a. m., 75th meridian time, are sent automatically every second, omitting the 29th, 55th, 56th, 57th, 58th, and 59th, until $11^h.\ 59^m.\ 50^s.$, after which there are no more signals until noon when there a lo signal, made long purposely to insure the acting of the electro-m which are used on the ball-detaching apparatus. Operating over Government lines, the Observatory also drops a time-ball in Washington and sets to correct time several hundred clocks which have been placed in the Government offices. These are ordinary clocks with the addition of a simple mechanical device operated by electricity, by which they may be corrected when they have gone astray.

The Observatory has been greatly hampered in this branch of its work by lack of funds. In view of the great importance of the ball-signals to mariners and others, there should be a system of return signals by which the errors in the dropping of the various time balls may be measured and given to the public. The system of corrected clocks might be advantageously extended to all the Government offices, insuring accurate and uniform time for the transaction of Government business. An appropriation is greatly needed for these purposes.

The fact that the Government has never formally adopted a standard of time for the transaction of business has led to vexatious complications in land entries in territories in various ways and channels too well known to particularize. A standard of time is quite as important as one of weight or of measure, and the time distributed from the Observatory ought to be legalized by an act of Congress.

Forty-seven chronometers have been issued to ships and shore stations and thirty-three have been turned in. Thirty-five have been subjected to the usual tests of the temperature-room, and their tests in the chronometer-room are very nearly completed. The computations in connection with this work are nearly completed and the results of the trial will be submitted in a supplementary report. (See Appendix B.)

The following table shows the number and disposition of the chronometers belonging to the Navy:

Disposition.	Number.	Disposition.	Number.
At the Observatory	*149	Issued to ships	156
In use (at the Observatory)	19	Issued to shore stations	37
Ready for issue (at the Observatory)	35	At navy-yard, Mare Island	40
Under trial (at the Observatory)	†34		
Awaiting trial (at the Observatory)	6	Total	497
Being repaired	21		

*Of these 149, 148 with an estimated value of $42,365, were surveyed and condemned.

†These 34 chronometers will be ready for issue in two weeks.

In response to a circular letter from the bureau to watchmakers and dealers, 138 watches were submitted for a competitive trial. Of these the best twenty were purchased for use as comparing watches.

Lieutenant Taylor was assisted by Ensign B. C. Decker from August 1, 1889, until the latter's detachment January 6, 1890; Ensign T. J. Loomis from January 22 to April 8, 1890, and Ensign H. H. Whittlesey since February 25, 1890.

VII. INSPECTION OF INSTRUMENTS.

(Lieut. Walton Goodwin, U. S. Navy, in charge.)

Lieutenant Goodwin was detailed for this duty October 5, 1889, succeeding Ensign A. B. Clements, who was detached from the Observatory September 16, 1889.

There have been received at the Observatory, as the depot of nautical instruments for the Navy, many instruments of various kinds, the accumulation of years from the different navy-yards. The condition of a large majority of these instruments was such as to render them unfit for repairs or further issue. These, together with many old, worn-out, and useless chronometers in store here, the whole representing an invoice value of over $50,000, have been surveyed and recommended to be condemned and sold. Since the survey was held, other instruments have been received from various sources, the condition of many of which being such as to warrant a survey and condemnation.

Forty-seven sextants and twenty-three octants have been repaired. The eighty-five sextants and sixty-eight octants remaining for issue at the end of the fiscal year are, with the exception of five, old instruments that have been frequently repaired and must fail to give the satisfactory results of new and modern instruments.

It is recommended that a number of new sextants be purchased, so that vessels going in commission may be supplied with at least one new and superior instrument, fitted with the necessary glasses for day and night work; the repaired sextants on hand to be issued as ordinary ones, and no more octants to be purchased or repaired, and none of the latter to be issued after the present supply shall be exhausted.

Twenty-five spy-glasses and fifty binoculars represent the only new instruments that have been received for inspection and accepted. They are of high power and superior manufacture.

Twenty five mercurial barometers are undergoing repairs, on the completion of which they will be delivered to the New York navy-yard for inspection. The delicate nature of these instruments and the great risk incurred in their transportation suggest the expediency of keeping a supply on hand at each of the navy-yards, where they could be conveniently compared with the standard barometer and be subjected to the minimum risk of transportation.

Nautical instruments of various kinds, after careful inspection, have been supplied from the Observatory to the new ships that have been put in commission and to other vessels where deficiencies rendered them necessary.

The Bureau's attention is invited to the system it has inaugurated of having the nautical instruments for naval use practically under its immediate supervision at the Naval Observatory. Old and useless articles that have been carried on the books at the various navy-yards for years have been eliminated, and it can hardly be doubted that under the present careful manner of inspection by experts specially detailed for this work, commanding and navigating officers can fail to be satisfied with the efficiency of these instruments of precision, so essential to successful navigation.

VIII. MAGNETIC INSTRUMENTS.

(Ensign J. A. Hoogewerff, U. S. Navy, in charge.)

Ensign C. C. Marsh, U. S. Navy, was in charge of this department until January 6, 1890, though absent in Europe on duty in connection with magnetic work from July 3 to November 15, 1889, during which interval the duties of the office were performed by Ensign Hoogewerff, who finally succeeded Mr. Marsh on January 6, 1890. Ensign W. B. Hoggatt, U. S. Navy, was assigned to duty as assistant on January 11, 1890.

The self-recording megnetographs have been in operation continnously, with the exception of a short time in January, when they were examined, cleaned, and, when necessary, readjusted. The scale values in terms of force and the temperature corrections of the horizontal and vertical force instruments have been determined frequently during the year. Observations for absolute declination have been made twice each day, and the value of the base lines of the declination traces deduced from them.

Observations of the horizontal intensity of the earth's magnetic force have been made on four days of each month throughout the year.

The magnetic inclination (dip) has been determined at least eight times each month, using three needles in rotation.

The results of the absolute observations of declination, horizontal intensity, and dip have been reduced and combined with the continuous photographic records, and the declination, horizontal force, and vertical force tabulated for each hour of the year.

Drawings of the composite curves of declination for each month, and comparisons of the declination traces on disturbed days at Washington, Los Angeles, and Toronto have been made, and copies sent to magnetic observatories and persons interested in magnetic work. The results of the work to January 1, 1890, together with plates of the drawings made, have been prepared for printing and will soon be published.

The superintendent of the U. S. Coast and Geodetic Survey, Professor Carpmael, director of the Meteorological Service of Canada, and the director of the Imperial Russian Magnetic Observatory have shown great interest in the comparison of the declination traces taken here and at their observatories, and have kindly furnished copies of their traces for disturbed days in 1889; and the drawings of these comparisons will be reproduced in the volume soon to be published.

Two seismoscopes, connected with clocks kept rated, and a seismograph have been kept in working order throughout the year, but no earthquake shock of sensible magnitude has been experienced.

The magnetic instruments are in good order, but they are old and not equal in accuracy and sensitiveness to the instruments that are now made.

The number of permanent magnetic observatories in the world are:

Country.	No.	Country.	No.
England	3	Switzerland	1
France	6	China	1
Germany	2	Japan	1
Austria	2	Philippine Islands	1
Russia	1	Java	1
Belgium	1	Australia	1
Holland	1	South Africa	1
Denmark	1	Madagascar	1
Spain	1	Mauritius	1
Portugal	1	Brazil	1
Argentine Republic	2	Canada	1
Chili	1	United States	1

It will be seen from this list that nearly every nation of any importance maintains at least one such observatory, which, in most cases, is fitted up with the most improved modern instruments.

The United States has but one, and in order to do her part for the promotion of science, and particularly of a science, so intimately connected with navigation, this observatory, established and maintained by our Navy Department, should be fitted with the best instruments, and equipped so that its contributions to science, particularly to the science of navigation, should be equal to those of any such observatory in the world.

The services of a laborer to keep the magnetic buildings in order, attend to the arrangements for securing an even temperature in the magnetograph room, and to read and record temperatures, are urgently required. A salary of $720 per annum would secure the services of a man who, in addition to these duties, could be trained to develop the photographs, make prints, and do other work which at present takes up much of the time of the officers in charge that could then be more profitably employed.

IX. THE LIBRARY.

(Assistant Astronomer Paul in charge.)

The contents of the library on June 30, 1890, as shown by the accession book, were 12,643 volumes and 2,915 pamphlets, the accessions during the year having been 630 in number, 417 volumes and 213 pamphlets. Of these, 403 were received as exchanges and 227 were purchased.

The number of accessions would have been considerably increased by bound volumes of periodicals if any binding had been done. But the binding for the library has of late fallen behind, first, on account of the exhaustion of the Department's fund for printing and binding during a large part of the year, and, secondly, from the lack of sufficient assistance promptly to prepare volumes for the bindery.

The third edition of Yarnall's Catalogue of Stars, prepared by Professor Frisby, was received from the printer and distributed to our entire exchange list. As the stars have been renumbered in this edition, and hence the numbers need to be distinguished from those of the first two editions, it is suggested that "Yarnall [F]" be used as a brief and distinctive reference to this third edition of the catalogue.

The following publications have also been received from the printer:

1. The Annual Report of the Superintendent for 1889.
2. The Annual Volume for 1884.
3. 1885, Appendix II.—Saturn and its ring, by Prof. Asaph Hall.
4. 1885, Appendix I.—International Astrophotographic Congress, by Lieut. A. G. Winterhalter.

The following are in press:

1. The Annual Volume for 1885.
2. 1885, Appendix III.—The Solar Parallax and its Related Constants, by Prof. William Harkness.

These are nearly completed, and it is expected that they will be distributed before January 1, 1891.

Through a wide system of exchanges for our own publications, and a careful purchase of such works as could not be obtained in exchange (both continued for many years), the library of the Naval Observatory has now grown to be by far the most complete and valuable library of reference in astronomy to be found this side of Europe, and it is fairly equipped in the literature of mathematics, physics, chemistry, geodesy, meteorology, engineering, and geography.

In order to secure the proper care and administration of a valuable and rapidly-growing library of this character it has been found necessary to take one of the assistant astronomers from his proper astronomical duties to give his whole time as librarian.

As at present arranged, all the library work, including the examination and cataloguing of all new accessions, the careful preparation of the same for the bindery, the daily registration of periodicals and books received, the examination of book-catalogues and ordering of books, the careful supervision of the distribution of the observatory publications and filing of receipts for the same, the registration and occasional inventory of books taken out of the library, and the library correspondence devolves upon the librarian with such limited assistance as he can obtain from one messenger when the latter is not elsewhere engaged.

The librarian finds that he can not, even with eight or nine hours' work daily, keep the current work of the library up to date. No inventory of the contents of the library has been taken for at least twelve years, and there is no shelf list or other other reliable catalogue by which to check the contents, even if time and assistance were available to do it. With the removal of the library to the new observatory it will be necessary to reclassify and recatalogue the library entirely anew, and a large increase of library assistance will be indispensable. If a part of this were available at once, very much of the necessary preliminary work could be done to better advantage here before removal.

By reason of the foregoing, and especially in view of the imperative need of more help to keep up the current work as it is, it is hoped that the estimate submitted for an assistant librarian and a cataloguer will receive the favorable consideration of Congress.

PERSONNEL.

Out of the corps of twelve professors of mathematics in the Navy, there are now only six who are on duty as astronomers; one of the ablest of these will be retired shortly, leaving but five for service at the Observatory and Nautical Almanac Office. In contrast with this there were in 1876, and for several years about that time, six professors of mathematics, well known as astronomers, engaged in active work at the Observatory alone. The issuing of the annual volumes of the Observatory has been for years falling farther and farther behind, until now publication is five years behind the observations, and the amount of work done has been growing less and less. Important improvements in instruments and in methods of observation, as well as new and equally important lines of research, many of which are actively pushed forward at the principal Government observatories, have here been entirely neglected on account of the lack of practical astronomers to make independent observations and to carry on special investigations in conjunction with other observatories. In this connection, it is much to be regretted that from the cause just mentioned this observatory was unable to perform its part in observing the positions of the stars in the zone assigned to complete a chart of the heavens.

From the organization of this naval institution, its personnel must be drawn principally from officers of the Navy; and it is necessary to appoint some professors of mathematics, astronomers of known experience, as it is mainly to this corps that the Observatory has to look for aid to keep up its astronomical reputation.

It is scarcely necessary to add that, when the new Naval Observatory is completed and equipped, the force of astronomers and assistant astronomers will have to be materially increased if the observatory is to be worthy of our great and progressive country.

The reductions and computations of the transit of Venus observations of 1874 and 1882 are in charge of Prof. William Harkness, U. S. Navy, who is attached to the Observatory on this special duty. His report is hereto appended.

NEW NAVAL OBSERVATORY.

The work on the new Naval Observatory is slowly approaching completion, but it can not be finished before the spring of 1891. The principal cause for the delay in the construction of the buildings is attributed to the want of cement of a quality to pass the prescribed tests, and procrastination in the delivery of marble.

The condition of the work to date is as follows:

Main building.—Under contract, the walls are nearly finished, the iron roofing ready to put in place, and the building should be under cover by November. The small equatorial pier is built to a level with the first floor; steam-heating work is partially done; cold-air ducts are commenced. Small equatorial stairs, plumber, joiner, carpenter, and plasterers' work, etc., to finish the interior of building, are yet to be done.

Great equatorial.—Walls, marble and brick, are practically completed, and the roof partially finished. This work has been delayed for the want of a few pieces of marble, which are now arriving, but can be completed in ten days. The dome and basement pier have been contracted for.

Clock and observers' rooms are under cover and nearly completed; the erection of the basement clock-piers has been contracted for.

Three transit-circle rooms.—Floor beams are being laid, and the ironwork for their respective superstructures is ready, with the exception of the shutters, which are yet to be ordered. The basement piers have been contracted for, and this work should be done in three months.

Prime-vertical.—This building has not yet been commenced, as the ground assigned to it is occupied by the old mansion, but this is now being torn down and the erection of this small prime-vertical building can easily be completed in three months.

Boiler-house.—Completed except a few minor items.

Drain pipes, soil pipes, and cesspool are not completed.

Estimates.—As it is proposed to occupy the new observatory during the summer of 1891, estimates will be submitted for new instruments, for moving and mounting old instruments, for water supply, lighting, laying out grounds, for furniture, officers' quarters, etc., and for necessary expenses to manage this new establishment.

Very respectfully,

F. V. McNair,
Captain U. S. Navy, Superintendent.

The Chief of the Bureau of Equipment.

Appendix A.

[Report of Prof. William Harkness, U. S. Navy, of the Transit of Venus Commission.]

Naval Observatory,
Washington, July 15, 1890.

Sir: I have the honor to report that during the year ending June 30, 1890, I had no assistants, and nearly all my time was devoted to investigations and computations connected with my work on the solar parallax and its related constants.

As is well known, there exists a vast mass of astronomical, geodetic, gravitational, and tidal observations which have hitherto been discussed piece-meal, and have therefore yielded only isolated results. My object has been to deal with these observations as a whole, and to derive from them a homogeneous system of constants satisfying all the conditions imposed by our present theoretical knowledge. For that purpose recourse was had to the method of least squares, and a suitable system of simultaneous conditional equations was formed. The constants involved in these equations were the size of the earth, the lengths of the seconds pendulum, the sidereal month and the sidereal year, the ratio of the mean motions of the earth and moon, the eccentricities of the orbits of the earth and moon, the inclination of the moon's orbit, the rate of regression of its node, and certain co-efficients occurring in the lunar theory, and the first step was to ascertain the best values of these quantities. The observed quantities to be corrected by the least-square adjustment were the solar and lunar parallaxes, the constants of precession and nutation, the parallactic inequality of the moon's motion, the lunar inequality of the earth's motion, the constant of aberration, the light equation, the velocity of light, the flattening of the earth, the masses of the earth and moon, and indirectly, the masses of Mercury and Venus. In order to obtain proper values of these quantities for use in the conditional equations it was necessary to collect and discuss all the available astronomical, geodetic, gravitational, and tidal data; and, as this discussion included a special investigation of the masses of Mercury and Venus, the labor involved proved very great. Some unexpected delays have occurred, but the work is now so far advanced that 111 pages of it are in type, and it is believed that the entire paper will appear in the forthcoming Observatory volume for the year 1885.

Very respectfully,

WM. HARKNESS,
Professor of Mathematics U. S. Navy,
Of Executive Committee of Transit of Venus Commission.

The SUPERINTENDENT OF THE NAVAL OBSERVATORY.

APPENDIX B.—*Results of tests of repaired chronometers at*

Time, 1890		Feb. 5 to Feb. 12.	Feb. 13 to Feb. 20.	Feb. 21 to Feb. 28.	Mar. 1 to Mar. 8.	Mar. 9 to Mar. 16.	Mar. 17 to Mar. 24.	Mar. 26 to Apr. 2.	Apr. 4 to Apr. 11.	Apr. 13 to Apr 20.	Apr. 21 to Apr. 28.
Temperature, Fahrenheit		51.51	58.98	68.99	79.37	89.22	79.39	69.37	58.92	51.49	66.89
Relative humidity, per cent.		60.3	67.2	72.4	61.8	66.0	60.0	53.2	59.4	65.0	66.3
Makers.	*Nos.*										
T. S. & J. D. Negus	1657	—0.203	+0.063	+0.217	+0.043	—0.111	—0.169	—0.416	—0.279	—0.124	+0.019
Wm. Bond & Son	273	—0.489	—0.116	—0.033	—0.529	—1.290	—0.526	—0.344	—0.350	—0.374	—0.410
Wm. Bond & Son	295	+0.833	+1.599	+1.789	+1.543	+0.424	+1.439	+1.584	+1.741	+1.019	+2.090
T. S. & J. D. Negus	589	+0.261	+0.956	+1.217	+1.043	+0.174	+1.117	+1.191	+1.043	+0.269	+1.661
T. S. & J. D. Negus	1615	+0.583	+0.706	+1.039	+0.757	+0.317	+0.403	+0.334	+0.400	+0.554	+0.554
Wm. Bond & Son	514	+0.797	+1.206	+1.003	+0.471	—0.183	+0.653	+0.941	+1.257	+1.161	+1.590
T. S. & J. D. Negus	1745	—0.453	+0.349	+0.503	+0.186	—0.933	—0.026	+0.227	+0.079	—0.839	+0 269
Do	1113	—0.739	—0.116	—0.283	—0.636	—1.826	—0.883	—0.344	—0.350	—0.910	—0.053
Do	1347	—0.560	—0.009	+0.181	—0.136	—1.469	—0.383	—0.059	—0.421	—1.124	—0.017
Do	1229	—0.453	—0.080	—0.461	—0.564	—1.790	—0.383	+0.191	—0.029	—0.767	+0.019
Do	1094	—0.881	+0.170	+0.646	+0.293	—0.397	—0.026	—0.166	—0.350	—1.017	+0.233
Do	1194	+0.476	+1.134	+1.646	+1.471	+0.139	+1.189	+1.049	+1.364	+0.590	+1.554
Do	772	—0.953	—0.116	+0.289	—0.314	—1.361	—0.597	—0.539	—0.636	—1.017	—0.196
Do	1299	—0.560	+0.277	+0.539	+0.114	—1.111	—0.276	+0.120	—0.243	—0.981	+0.054
Do	1641	—0.881	—0.366	—0.283	—0.836	—1.286	—0.811	—0.237	—0.564	—0.910	—0.267
Do	1145	—1.560	—0.187	—0.104	+0.221	—0.754	—0.026	+0.513	+0.150	—1.124	+0.340
Wm. Bond & Son	243	—0.989	—0.009	+0.539	—0.064	—0.576	+0.224	—0.023	—0.457	—1.231	+0.269
Barraud	2594	—0.203	+0.206	+0.431	—0.207	—1.469	—0.704	—0.273	—0.314	—0.660	—0.124
T. S. & J. D. Negus	1304	+0.083	+0.777	+0.824	—0.136	—1.111	+0.026	+0.227	+0.257	+0.054	+0.519
Penlington	1741	+1.476	+1.563	+1.181	—0.064	—1.433	—0.097	+0.906	+1.900	+1.590	+1.376
T. S. & J. D. Negus	700	—0.169	+0.599	+0.253	+0.007	—0.790	+0.117	+1.120	+0.543	—0.196	+0.947
Do	1595	—0.774	—0.099	+0.396	—0.314	—1.397	—0.597	—0.023	—0.100	—1.160	+0.054
Do	1189	—1.174	—0.759	—0.319	—0.921	—1.933	—1.419	—0.987	—1.064	—1 589	—0.553
John Bliss & Co	2484	—2.417	—1.473	—0.926	—1.814	—2.826	—2.169	—2.023	—1.921	—2.124	—1.339
T. S. & J. D. Negus	1327	—1.810	—1.009	—0.676	—0.743	—1.254	—0.061	+0.191	—0.957	—2.017	—0.910
Do	1281	—1.631	—0.080	—0.390	—0.814	—2.076	—0.954	—0.416	—0.529	—1.910	—0.410
Wm. Bond & Son	510	+2.797	+3.063	+2.717	+2.114	+0.996	+2.439	+3.620	+3.971	+3.554	+4.019
Jas. Munroe	266	+1.297	+1.041	+0.717	—0.467	+0.710	—0.204	+0.406	+0.936	+0.840	+0.590
T. S. & J. D. Negus	1088	—0.881	—0.009	+0.146	—0.029	—0.540	+0.546	+0.406	+0.007	—1.803	+0.911
Do	509	+0.024	+0.813	+0.753	—0.064	—1.540	—1.097	—0.701	+0.064	—0.267	+0.447
Wm. Bond & Son	307	+0.333	+0.884	—0.069	—1.243	—2.183	—0.633	+0.834	+0.971	+0.626	+1.376
T. S. & J. D. Negus	1449	+0.369	+0.813	+0.681	—0.064	—1.504	—0.883	—0.559	—0.850	—1.339	—0.124
Do	1232	—1.831	—1.080	—0.033	—0.029	—2.040	—0.633	—0.201	—0.921	—1.410	—0.910
Do	997	+1.119	+1.080	+1.539	+0.864	—0.290	+0.903	+2.049	+1.649	+0.376	+2.626
Bliss & Creighton	2143	—3.274	—2.830	—1.604	—1.957	—2.326	—1.990	—2.416	—2.529	—3.339	—1.910

the Naval Observatory—February 5 *to July* 14, 1890.

Apr. 28 to May 5.	May 5 to May 12.	May 12 to May 19.	May 19 to May 26.	May 26 to June 2.	June 2 to June 9.	June 9 to June 16.	June 16 to June 23.	June 23 to June 30.	June 30 to July 7.	July 7 to July 14.	Temperature of compensation.	Temperature of constant.	Trial number.	Relative number.
69.21	68.68	72.14	72.19	74.13	80.17	78.56	78.28	82.32	81.43	80.91				
67.4	68.0	73.0	70.0	65.0	68.0	71.8	71.1	67.5	71.2	64.7				
-0.107	-0.110	-0.174	-0.271	-0.411	-0.300	-0.471	-0.471	-0.854	-0.384	-0.670	60.67	+0.00013	6.406	1
-0.321	-0.360	-0.396	-0.379	-0.447	-0.657	-0.686	-0.614	-0.890	-0.884	-0.884	65.26	-0.00184	6.589	2
+2.107	+2.426	+2.433	+2.479	+2.374	+2.200	+1.957	+2.100	+1.896	+1.973	+1.937	68.51	-0.00166	6.740	3
+1.714	+1.747	+1.754	+1.800	+1.874	+1.450	+1.600	+1.493	+1.289	+1.401	+1.437	70.43	-0.00157	6.761	4
+0.643	+0.783	+0.754	+0.943	+0.910	+0.986	+0.921	+0.993	+1.003	+1.116	+0.830	69.74	-0.00114	9.080	5
+1.750	+1.890	+1.933	+1.907	+1.981	+1.843	+1.814	+1.921	+1.753	+1.794	+1.759	46.68	-0.00073	9.564	6
+0.107	+0.140	+0.004	+0.014	-0.019	-0.300	-0.329	-0.257	-0.533	-0.456	-0.527	67.61	-0.00208	10.160	7
-0.107	-0.110	-0.210	-0.200	-0.447	-0.943	-0.971	-0.936	-1.319	-1.241	-1.349	61.83	-0.00175	11.400	8
+0.107	+0.104	+0.004	-0.129	-0.269	-0.586	-0.471	-0.114	-0.461	-0.670	-0.670	68.78	-0.00286	13.058	9
+0.071	+0.033	-0.210	-0.236	-0.483	-0.693	-0.579	-0.543	-0.961	-0.813	-0.813	60.91	-0.00124	13.737	10
+0.429	+0.497	+0.576	+0.657	+0.696	+0.629	+0.564	+0.564	+0.431	+0.509	+0.474	71.77	-0.00209	15.135	11
+1.571	+1.711	+1.504	+1.443	+1.410	+1.164	+1.136	+0.957	+0.646	+0.759	+0.830	72.77	-0.00055	15.874	12
0.000	+0.104	-0.067	-0.129	-0.197	-0.443	-0.471	-0.436	-0.783	-0.741	-0.884	68.44	-0.00269	16.361	13
0.000	-0.039	+0.040	+0.086	-0.054	-0.336	-0.364	-0.329	-0.604	-0.527	-0.509	68.47	-0.00346	17.746	14
-0.429	-0.360	-0.460	-0.379	-0.519	-0.979	-0.936	-0.829	-1.247	-1.099	-1.170	66.70	-0.00380	18.254	15
+0.536	+0.426	+0.754	+0.621	+0.481	+0.736	+0.707	+0.671	+0.467	+0.616	+0.437	70.95	-0.00157	18.475	16
+0.536	+0.497	+0.576	+0.550	+0.553	+0.450	+0.350	+0.457	+0.324	+0.616	+0.116	71.55	-0.00320	19.729	17
-0.071	+0.211	+0.183	+0.264	+0.196	-0.300	-0.221	-0.150	-0.569	-0.599	-0.491	66.10	-0.00319	21.823	18
+0.679	+0.747	+0.933	+1.050	+0.910	+0.129	+0.279	+0.279	-0.033	+0.187	+0.259	64.20	-0.00290	22.634	19
+1.143	+0.961	+0.826	+0.443	+0.267	-0.229	-0.221	-0.186	-0.604	-0.670	-0.706	48.03	-0.00210	23.062	20
+0.857	+0.890	+0.647	+0.693	+0.410	+0.307	+0.314	+0.350	-0.033	+0.259	+0.223	65.65	-0.00354	23.624	21
+0.000	+0.104	+0.004	+0.086	-0.233	-0.657	+0.650	+0.614	-1.176	-0.777	-1.027	66.35	-0.00398	23.986	22
-0.036	-0.574	-0.353	-0.450	-0.447	-0.586	-0.614	-0.614	-0.711	-0.777	-0.777	67.46	-0.00371	25.183	23
-1.429	-1.360	-1.353	-0.986	-1.126	-1.264	-1.293	-1.114	-1.319	-1.170	-1.170	67.14	-0.00354	28.324	24
-0.250	-0.181	-0.103	-0.036	-0.126	-0.407	-0.257	-0.257	-0.711	-0.527	-0.527	72.46	-0.00431	34.394	25
+0.107	+0.176	+0.397	+0.586	+0.624	-0.264	-0.900	-1.007	-1.319	-1.170	-1.313	61.43	-0.00183	34.748	26
+3.393	+3.283	+2.826	+2.514	+2.589	+1.807	+1.743	+1.600	+1.324	+1.544	+1.544	57.53	-0.00261	36.741	27
+0.357	+0.390	+0.254	+0.264	+0.017	-0.264	-0.507	-0.543	-0.461	-0.599	-0.491	49.38	-0.00175	39.774	28
+0.679	+0.926	+1.147	+1.407	+1.624	+1.807	+0.850	+0.100	+1.146	-0.206	+0.044	73.65	-0.00141	40.667	29
+0.607	+0.711	+0.754	+0.800	+0.731	+0.593	+0.600	+0.636	+0.360	+0.473	+0.259	50.38	-0.00124	42.084	30
+0.893	+0.854	+0.826	+0.943	+0.589	+0.063	+0.136	+0.136	-0.140	+0.151	+0.187	56.91	-0.00372	42.148	31
-0.107	-0.181	-0.281	-0.343	-0.376	-0.728	-0.900	-0.829	-1.140	-0.956	-0.991	65.38	-0.00293	54.521	32
-1.321	-1.789	-2.246	-2.343	-2.197	-1.514	-1.043	-0.543	-1.533	-1.420	-1.491	72.28	-0.00525	55.814	33
+3.107	+3.176	+3.607	+3.443	+1.267	+0.966	+0.957	+0.814	+0.753	+0.651	+2.937	63.08	-0.00399	80.106	34
-2.179	-2.324	-2.067	-1.986	-2.126	-2.657	-1.471	-1.543	-1.354	-0.849	......	74.86	-0.00303	......	...

APPENDIX C.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1 by the U. S. Naval Observatory.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriat for the current fisc year endin June 30, 18
SALARIES.			
One assistant astronomer (acts August 5, 1882, July 11, 1890; R. S., p. 27, sec. 167; Stats. L., vol. 22, p. 245, sec. 1)	$2,000.00		
Two assistant astronomers, at $1,800 each (same acts)	3,600.00		
One clerk of class four (same acts)	1,800.00		
One instrument-maker (same acts)	1,500.00		
Four watchmen, including one for the new Naval Observatory grounds (same acts)	2,880.00		
One skilled laborer, at $1,000; one skilled laborer, at $720 (same acts)	1,720.00		
Seven laborers, at $660 each (same acts)	4,620.00		
Two computers, at $1,200 each (same acts)	2,400.00		
The following additional estimates are submitted:			
Two computers, at $1,200 each (see note) (submitted)	2,400.00		
One assistant librarian (see note) (submitted)	1,600.00		
One cataloguer for library (see note) (submitted)	1,000.00		
One copyist (see note) (submitted)	900.00		
One laborer (magnetic observatory) (see note) (submitted)	720.00		
One messenger and mail carrier (see note) (submitted)	900.00		
		$28,040.00	
CONTINGENT AND MISCELLANEOUS EXPENSES.			
Miscellaneous computions (acts August 5, 1882, July 11, 1890; 22 Stats., p. 245, sec. 1)	1,200.00		
Books, periodicals, engravings, photographs, and fixtures for the library (same acts)	1,000.00		
Apparatus and instruments, and for repairs of the same (same acts)	2,500.00		
Repairs of buildings, fixtures, and fences; for fuel, furniture, gas, chemicals, stationery, freight, including payment to Smithsonian Institution for freight on Observatory publications sent to foreign countries; for foreign postage, expressage, fertilizers, plants, and all contingent expenses (same acts)	4,550.00		
		9,250.00	9,250.(

NOTE.—(1) *Two computers:* The services of two additional computers are needed in order that the reductions may keep pace with the observations, and that the work on hand, several years in arrears, may be completed for publication. (2) *One assistant librarian and one cataloguer for library:* The library of the Observatory, embracing over 15,000 books and pamphlets, is the most complete and valuable one, as regards astronomy, etc., in this country. For its proper care and administration it was found necessary to take one of the assistant astronomers from his legitimate astronomical duties and appoint him librarian. The work embraces the examination and cataloguing of all new accessions, the preparation of the same for the bindery, the daily registration of periodicals and books received, the examination of book catalogues and the ordering of books, the distribution of Observatory publications, and the library correspondence. It is earnestly hoped that Congress will recognize the existing urgent need for these two assistants in the library. (3) *One copyist:* The services of a copyist are needed, for the reason that the Observatory has but one clerk in charge of its correspondence and accounts, and the work pertaining to his desk is more than one person, unaided, can perform. (4) *One laborer in magnetic observatory:* The services of a laborer are necessary to keep the magnetic buildings in order, to attend to arrangements for securing an even temperature in the magnetograph room, to record temperatures, and to develop photographs and make prints. (5) *One messenger and mail-carrier:* There is none attached to the Observatory, and the necessity for one speaks for itself.

APPENDIX D.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, *by the New Naval Observatory, additional to the estimates for the Naval Observatory.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.
SALARIES.		
Two assistant astronomers, at $2,000 each (submitted)	$4,000.00	
Three computers, at $1,500 each (submitted)	4,500.00	
One electrician (submitted)	1,800.00	
One photographer (submitted)	1,500.00	$11,800.00
PAY OF ENGINEERS, FIREMEN, PATROLMEN, AND OTHERS FOR THE CARE AND PRESERVATION OF MACHINERY, WATER SUPPLY, GROUNDS, PIPES, AND OTHER PUBLIC PROPERTY.		
One engineer (submitted)	1,200.00	
One assistant engineer (submitted)	1,000.00	
Two firemen, at $720 each (submitted)	1,440.00	
One carpenter (submitted)	1,000.00	
Four patrolmen, at $720 each (submitted)	2,880.00	
One driver (submitted)	620.00	
One teamster (submitted)	620.00	
One foreman in charge of laborers in grounds (submitted)	1,200.00	
Three attendants to buildings, at $660 each (submitted)	1,980.00	
Three laborers, at $660 each (submitted)	1,980.00	13,920.00
CONTINGENT AND MISCELLANEOUS.		
For purchase and maintenance of teams and their appurtenances, forage, fuel for heating and lighting buildings and grounds, and for obtaining power for machinery, and all contingent expenses (submitted)	5,000.00	5,000.00
NOTE.—The new Naval Observatory will be turned over to the Government by the contractors on July 1, 1891. These additional estimates are necessary to carry on the observatory work, and for the care and preservation of the extensive grounds, buildings, and machinery.		

REPORT OF SUPERINTENDENT OF NAUTICAL ALMANAC.

NAUTICAL ALMANAC OFFICE,
BUREAU OF EQUIPMENT, NAVY DEPARTMENT,
Washington, D. C., September 15, 1890.

SIR: In compliance with the order of the Bureau, I have the honor to submit the following report of the work of this office during the past year:

PRINTING.

The Atlantic and Pacific Coaster's Nautical Almanacs for 1890 were issued in October, 1889.

The American Nautical Almanac for 1893 was issued in June, 1890.

The American Ephemeris for 1893 is stereotyped, and will be ready for printing as soon as the final examination of the stereotype proofs is completed.

Of the Almanac and Ephemeris for 1894, 257 pages are now in type.

DISTRIBUTION.

During the fiscal year ending June 30, 1890, the sale and distribu of the preceding publications were as follows:

Publications.	Sold.	Distributed
American Ephemeris	605	
American Nautical Almanac	2,285	
Atlantic Coaster's Nautical Almanac	1,030	
Pacific Coaster's Nautical Almanac	729	

The proceeds of sales, amounting to $1,434.12 have, in compliance with law, been deposited in the Treasury to the credit of the appropriation for public printing and binding.

COMPUTATIONS.

The general system of computations is the same as in former years. The computations for the year 1894 were nearly finished in the last fiscal year, and the ephemerides of the sun and moon for 1895 were c menced.

REMOVAL OF THE OFFICE.

In December, 1889, the rooms in the State, War, and Navy Building which had been occupied by the Nautical Almanac since February, 1883, being needed by the Navy Department, quarters were assigned this office at the navy-yard, and the computers who could not be accommodated there were permitted, temporarily, to remove their desks to and perform their work at their homes. In accordance with the recommendation of the Department, Congress made an appropriation of $1,000 for rent and fuel for the office, and quarters have been found at the northwest corner of Pennsylvania avenue and Nineteenth street, northwest

NEW TABLES OF THE PLANETS.

It has been found necessary to re-reduce the Greenwich observations up to the end of 1834, the epoch when Professor Airy undertook the direction of the Greenwich Observatory. There is also a gap in the modern reductions of the observations between 1757 and 1765 which may have to be filled if time allows.

Ten years have elapsed since the work of completely revising the elements and masses of the four inner planets was seriously commenced. The completion of all the computations required for the comparison of observations with the older tables by June, 1892, is urgently required. No difficulty would have been found in doing so had the corps of assistants been kept full. But during the last three years about $1,500 of the appropriation for assistants has been covered back into the Treasury, owing to the delays in finding qualified persons willing to take the vacant places at the salaries offered. An estimate for the addition of this amount to the appropriation for the next fiscal year will be submitted to the Department.

PUBLICATIONS.

The rediscussion of the transits of Venus observed in 1761 and 1769, the completion of which was reported last year, has been printed as Volume II, Part VI, of the Astronomical Papers prepared for the American Ephemeris.

The computations of the perturbations of the four inner planets are now in press, to appear as Volume III, Part VI, of the same series.

Volume IV of the series, comprising Mr. Hill's Theory of Jupiter and Saturn, was issued in June last.

Very respectfully, your obedient servant,

S. NEWCOMB,
Superintendent Nautical Almanac.

The CHIEF OF BUREAU OF EQUIPMENT.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, *by the Nautical Almanac Office, U. S. Navy.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
SALARIES.			
Salaries of assistants in preparing for publication the American Ephemeris and Nautical Almanac, viz:			
Three assistants at $1,600 each (act July 11, 1890)	$4,800.00		
Two assistants at $1,400 each (same act)	2,800.00		
Three assistants at $1,200 each (same act)	3,600.00		
Two assistants at $1,000 each (same act)	2,000.00		
One copyist and typewriter, $900 (same act)	900.00		
One assistant messenger, $720 (same act)	720.00		
One laborer, $660 (same act)	660.00		
		$15,480.00	$15,480.00
Pay of computers on piece-work in preparing for publication the American Ephemeris and Nautical Almanac, and in improving the tables of the planets	9,900.00	9,900.00	8,400.00
NOTE.—The increase of $1,500 asked for in the appropriation for piece-work is urgently required to advance the work, the sum of $1,487.43 having been returned to the Treasury from the appropriations for salaries during the last three fiscal years, owing to vacancies in the corps of assistants.			
RENT AND FUEL.			
For rent and fuel for Nautical Almanac Office (same act)	1,000.00	1,000.00	1,000.00

REPORT OF INSPECTOR OF ELECTRIC LIGHTING.

NAVY DEPARTMENT, BUREAU OF EQUIPMENT,
Washington, D. C., October 10, 1890.

SIR: I beg leave to submit the following report of the condition of the work coming under the supervision of this office:

ELECTRIC LIGHTING PLANTS ON SHIPS.

There remain at this date but two wooden cruising vessels, the *Omaha* and *Pensacola*, that are furnished with electric lighting plants. These plants, fully described in the reports of my predecessor in office, have been in successful operation and have given satisfaction. They have required only slight repairs, which, in most cases, have been effected by the labor of the ship. Congress having made an appropriation for installing an electric lighting plant on board the United States steamship *Lancaster*, bids were requested from different electrical companies after specifications prepared in this office, based upon those for the *Pensacola*. These bids being greatly in excess of the sum appropriated, it will not be possible to install a lighting plant this year, and it is ommended that the appropriation be increased.

The receiving-ship *Vermont*, together with the library building cated on the Cob Dock, are now lighted by electricity, the mate being furnished by contract, and the work of installing done by ship's mechanics. This method is not satisfactory, and better re would have been obtained by the employment of skilled labor. engine, dynamo, and boiler are located on the Cob Dock near boiler-house.

The engine is a 30 horse-power, one-cylinder, direct-acting, horizo Ball engine, and is belted to a commercial Continental dynamo of r capacity of 195 ampères at 110 volts; speed, 1,220 revolutions per min The plant is in operation, though not entirely completed, owing to delay in obtaining fixtures to replace those rejected.

All of the new vessels, with the exception of sea-going Torpedo- No. 1, the *Cushing*, are furnished with electric plants which have in operation, in most cases, with satisfaction. Those on board *phin* and *Boston* are in need of extensive repairs. In the case former vessel the plant was among the first installed, and w the builder, who was simply required to light the ship by the The plant was probably considered at the time it was instal well adapted to the needs of the service, but actual test l that it is not. Orders have been given to thoroughly ov plant and to install a direct-coupled engine and dynamo, wh to the undesirable location of the one now on board, will be p the berth-deck, on the port side, forward of the ward-room

With regard to the plant of the *Boston*, it has not given and although in operation for a portion of the year, never efficient. The contractors, however, have expressed a willing supply a new belted dynamo and to put the plant in an efficient dition, and it is thought that upon the completion of their work b results will be obtained.

For obvious reasons direct-coupled plants for ship use are prefer to other forms, and it is recommended that whenever the present be types shall need extensive repairs, the change be made.

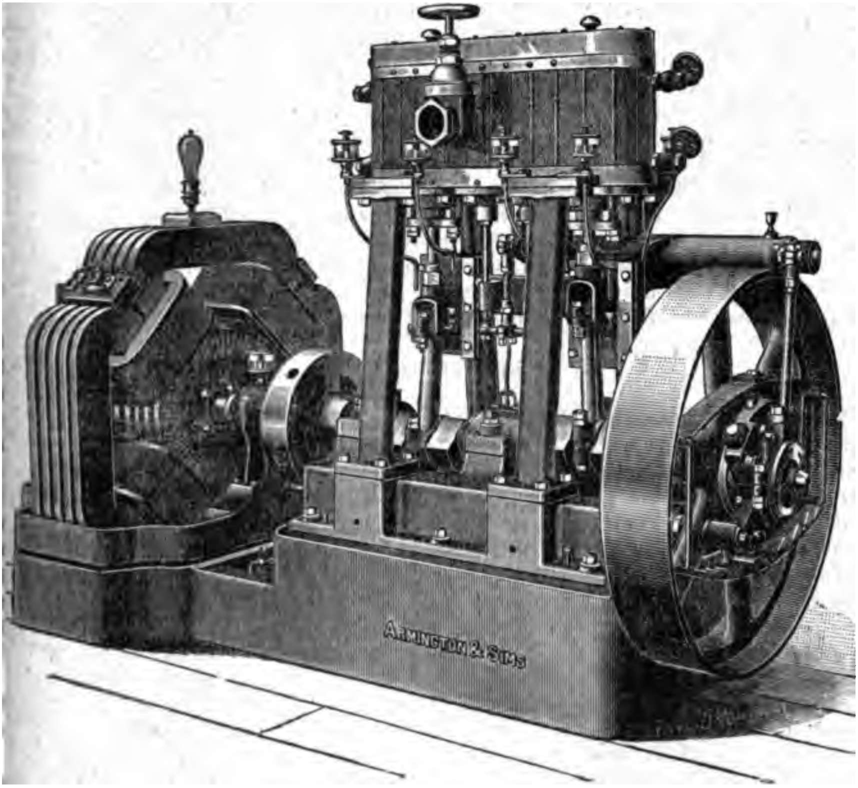
Within the past year electric-lighting plants have been installe the *Baltimore*, *Charlestown*, *Petrel*, *Vermont*, *Philadelphia*, *Vesuvius*, *San Francisco*, and are being installed upon the *Concord*, *Benning* *Newark*, and *Miantonomoh*. In the case of the latter vessel the cont time for finishing the work has long since expired. The necessity the contractors should give some evidence of their intention to comp their contract within a reasonable time has been brought to their no and it is hoped that the increased activity shown by their workme indicative of their intention to push the work to a speedy complet

The engine and dynamo, as installed on board the *Vesuvius*, is sh in the accompanying cut.

The engine is an Armington and Sims, two-cylinder, 5 by 3, sin and vertical. The dynamo is of the Thomson-Houston marine t compound, multipolar, of 80 volts and 50 amperes, supplied with brushes.

Weight of dynamo	pounds..	1
Weight of engine complete	do....	1
Weight of combination base	do....	
Total weight	do....	
Length of plant complete	inches..	
Width of plant	do....	
Height of plant	do....	

This plant subjected to the usual naval tests gave very satisfactory results. Its weight, however, is slightly in excess of what was expected. The government of the engine, designed to run at 500 revolutions, was, with varying conditions of steam pressure and load with both atmospheric and vacuum exhaust, remarkably close.



It is the intention, where height will permit, to give vertical engines the preference in future installations, and it is expected that they can be successfully operated without the use of lubricants in the cylinders.

SEARCH-LIGHTS.

All vessels lighted by electricity, with the exception of the *Omaha*, *Pensacola*, *Vermont*, and *Vesuvius*, are equipped with search-lights. Those recently furnished to the *San Francisco* are the most powerful yet placed on any of our vessels, being designed for 100 ampere current.

In the vessels first equipped a special dynamo was installed to operate the search-lights, but in the more modern plants they are operated by the same dynamos that are installed for the incandescent lighting. These special dynamos will be replaced, as fast as they wear out, by a direct-coupled dynamo suitable for incandescent lighting.

The Thomson-Houston Electric Company are under contract to furnish a number of search-lights of their own manufacture, and they are now being delivered. They will be placed on the monitors. This Company is also to supply a number of boat search-light outfits, which will be distributed to the larger vessels for use in their steam launches.

DYNAMO ROOMS.

Dynamo rooms being generally situated below the protective decks, their ventilation becomes a serious question. The ordinary means of ventilation supplied do not meet the demand, and in those vessels lately installed, independent means, in addition to general system, have b introduced, and there is still room for improvement. It is sugges that in the larger armored vessels there should be two dynamo ro one situated, as now, below the protective deck, and one above; or, in other words, to divide the electric plant into two parts, one adequate to the requirements of the vessel in action, to be placed, as now, below protective deck; the other, sufficient for the incandescent lighting o the ship, to be located above the protective deck and not dep d entirely upon artificial ventilation, thus reducing materially the perature and conducing to the health and comfort of the attend This practice has already been adopted in some of the foreign nav

SIGNALING.

There is an increasing demand for some means of transmitting general signals at night with greater rapidity than the methods now use. With vessels underway and sailing in company, the nec for the quick transmission of signals is imperative, and this subject is now receiving the careful consideration of this office, with the vie providing a suitable electric apparatus.

Two of the methods in use in foreign navies have been highly recommended; these, briefly, consist of a number of lights arranged in groups, with a suitable key-board. On many of our ships system of two or three lights with key-boards, the result of the ingenuity o officers, are in use. These improvised plans, no doubt, give more or less satisfaction, and are well adapted to the Morse code, but are too slow for the transmission of general signals particularly so in a rapidly-moving, maneuvering squadron. Again, the use of a space or t element should, if possible, be avoided as conducive to error. The u of a green light, on account of the absorbing powers of that color, ought also to be avoided. It is evident that any system answering the requirements of general signaling can be used for sending messages by any code.

INTERIOR MEANS OF COMMUNICATION.

This office is charged with the installation of all electrical appa connected with the interior communication of ships, as well as the tions of all other means of communication, and I would here beg leave to recommend that the whole subject of interior communication should be placed under the control of the Bureau of Equipment. As it is now managed, there is no one bureau to decide what the means for interior communication shall be, whether mechanical, pneumatic, electric, or otherwise, and as the demand for greater facility of intercourse between the different parts of a vessel increase, it is essential to the attainment of greater efficiency and to prevent duplication that the whole subject should be under one control.

In the control and government of vessels it is absolutely necessary that orders shall be transmitted with precision and promptness. For this purpose voice pipes are now installed between centers of control, fighting centers, as well as between other points essential to the efficient management of the ship. This necessitates a large number of pipes, which are more or less grouped in different localities. These pipes occupy much space, and can not always be led in a direct way; their great number limits their size, and the bends, elbows, and turns destroy the amplitude of the sound wave, so that unless the ear is close to the pipe the message is unintelligible, and a short distance away is entirely lost.

Considering the difficulty of transmitting with clearness and accuracy messages from one part of the vessel to another, steps were taken to test the value of the telephone for this purpose. The American Bell Telephone Company entered into the plan with much earnestness on being approached on the subject, and generously offered to undertake, at their expense, such tests as were necessary. The honorable Secretary of the Navy having given his approval to the experiment, and having designated the U. S. S. *Philadelphia* as the vessel upon which the tests should be made, the telephone company immediately gave the matter their attention, and are now ready to proceed with the tests. It isproposed to install two telephone circuits, one from the bridge to the engine-room and the other from the office of the executive officer to the general store-room, believing that all the conditions and peculiarities inherent in a ship will be encountered in these circuits. If the apparatus should fulfill all the requirements of perfect transmission on these circuits, it is confidently expected that there would be no difficulty in using the instrument upon any circuit that can be led on board ship, thus facilitating the introduction of means of interior communication and the saving of much space and weight.

RECOMMENDATIONS.

On account of the steadily increasing demands upon the electric plant of a ship, and its consequent extension to meet these requirements, the the care and attention necessary for efficiency is also growing. In view of this fact it is respectfully recommended that the rate of electrical machinist be established, with adequate pay, that will compensate and attract suitable persons, and that the rating be open to any enlisted man who possesses the necessary qualifications.

I beg leave to renew the recommendations of my predecessor in office as to the necessity of allowing a draughtsman for this office. The necessity is constantly arising for plans, working drawings, etc., which can only be obtained now by the kindness of some other bureau or office. In many cases it is impossible to get the drawings required, and "of an approved pattern" is still inserted in specifications with the same disadvantages as pointed out in the report of last year.

The necessity of a small force of skilled electrical mechancis at the navy-yards is still felt, especially at the New York Navy-Yard. The arguments advanced in last year's report have been strengthened by time, and the employment of such a force at the New York Navy-Yard during the past year would have saved much time and expense.

Respectfully submitted.

J. S. NEWELL,
Commander, U. S. Navy, Naval Inspector of Electric Lighting.

CHIEF OF BUREAU OF EQUIPMENT.

REPORT OF SUPERINTENDENT OF COMPASSES.

NAVY DEPARTMENT, BUREAU OF EQUIPMENT,
Compass Office, September 15, 1890.

SIR: I have the honor to submit the following report of the operations of the compass office during the past fiscal year:

I assumed charge of the office on October 12, 1889, relieving Lieut. W. H. Schuetze.

During the year 30 7½-inch, 84 boat, 10 6½-inch liquid compasses and fourteen azimuth circles were repaired and altered to conform to the latest standard type adopted for the naval service, and were required to fulfill the tests of the usual rigid inspection before acceptance.

The following new instruments were purchased for use in determining magnetic forces on board the steel vessels of the service and in compensation of the compasses, viz, ten compensating binnacles, with complete appliances for compass correction, were contracted for and made by E. S. Ritchie & Sons, Brookline, Mass., the lowest bidders:

Six horizontal vibration instruments, 4 vertical force instruments, 5 wrought-iron tubes (Flinders bars), and 16 deck magnets were purchased for issue to steel vessels for the determination of the magnetic disturbing forces on the compasses and their compensation.

In addition there were purchased 6 pilot-house binnacles for use on tugs, the torpedo-boat, and the *Charleston*, where the contracted space would not accommodate the ordinary binnacle in the pilot-house or conning tower.

Six peloruses (dumb compasses), 6 bubble clinometers, and 12 adjustable curve rulers were purchased for use in the navigation of ships. All these instruments are in service or will be required in the immediate future.

Twenty-five copies of each of the following books were bought for issue to steel ships, viz:

Admiralty Manual, Deviations of the Compass (fifth edition). Evans's Elementary Manual for the Deviations of the Compass in Iron Ships (seventh edition).

These comprise the latest editions, and are intended to replace those heretofore supplied, which are of an early date and unequal to the demands of the service.

The inspection of magnets for the compensating binnacles, individual parts of compasses, and azimuth circles has been carried on from time to time during the process of construction of those instruments.

Compass reports, inventories, and curves of deviation, received from vessels in commission, have been verified or corrected and filed away for future use in the construction of variation charts and to eventually supply the service with a magnetic history of each ship.

The limited space in the pilot-houses of the *Charleston*, the tug *Triton*, and in the conning-tower of the torpedo boat made it necessary to use a smaller compass card than the 7½-inch, which is the size adopted for standard and steering purposes. A 6½-inch card was designed, containing [illegible] needles, similar to the 7½-inch type, without the card circle, and ten of the old 6-inch compasses in store were altered to the new form, some of which are now in service.

Navigators of the steel cruisers, prior to joining their vessels, have undergone a course of instruction at this office during the past year. The subject of magnetism as related to the compass and the various methods of compensation with the binnacle issued to the service have been carefully explained and practically illustrated by means of the model *Scoresby* mounted in this office.

The navigators of the *Charleston*, *Petrel*, *Baltimore*, *Philadelphia*, and *Vesuvius* have had the advantage of such instruction during the year.

It has been the aim of the office to disseminate compass information throughout the service, and all data received from the later ships will be published as time permits. The current work of supplying instruments and anticipating the needs of the service has consumed the greater part of the time of the limited force allotted to the office.

Communication has been freely kept up with navigators afloat and their compass difficulties promptly attended to whenever such have occurred.

Bureau circular No. 44, modifying the requirements of the compass reports, was issued in January last. These modifications relate to the distribution of iron and steel masses in the ship, to be omitted hereafter, as such data can be directly obtained from the Construction Department. A few requirements relating to the swinging of ships, before and after compensation, have been added.

Directions for the use of the United States Navy compensating binnacle, with several practical methods for finding curves of deviation and correcting compasses, have been drawn up and appear in the form of Bureau circular No. 45, and were in the hands of the printer at the end of the fiscal year.

In view of the increased demand for the compensating binnacle it became desirable to lessen its cost and at the same time decrease its weight and size in order to reduce the space required for its installation on board ship. The office devoted itself to this question for some time, and after a series of experiments designed a new form of binnacle, the details of which are shown in the drawings annexed. (See Sheet A, Figs. 1 to 5.)

The principal points of difference between this binnacle and the one in present use on board the steel vessels of the service consist of a decrease in weight and bulk, simplicity in mechanism, and reduction in size of magnets used. It possesses all the good qualities of the other binnacle and is adapted to the compensation of deviations ranging between the least and greatest amounts to be ordinarily expected on board ship.

The question of reduction in cost alone, with efficiency, is an important item, when it is considered that the service will require a large number of compensating binnacles in the next two or three years.

Letters Patent were taken out by Ensign Gibson and myself, the inventors, and the use of the invention given to the Government.

In addition to the routine work, the office has kept a watchful eye upon the improvements in foreign services. All contributions to the compass question from abroad, whenever obtainable, have been carefully investigated, including translations from the French and German, and are filed away for future reference.

Frequent experiments have been made in anticipation of compass work on board ship, and the results in a number of cases have been of value and are recorded in the files of the office.

Occasional queries have been received from the outside world, new inventions in connection with the compass have been submitted, and opinions based upon a careful investigation rendered in every case.

The most important duty that has fallen to the lot of this office during the past year has been the magnetic work required on board the steel vessels that have been commissioned, both on the Atlantic and Pacific coasts in that interval, and the calculations necessary in order to properly locate and compensate their compasses. Magnetic observations were taken at various times on board the torpedo-boat *Cushing*, the *Baltimore*, *Petrel*, *Charleston*, *Philadelphia*, *San Francisco*, tugs *Triton* and *Fortune*, and the dynamite cruiser *Vesuvius*. Standard compasses were located and both standard and steering compasses compensated on each of these vessels. A steering compass was placed in the forward conning tower of the torpedo-boat *Cushing*, and owing to the contracted space was suspended by hangers and a neat and practical compensation effected, as shown in the sketches, Figs. 6 and 7, on Sheet A.

A special binnacle was designed for the standard compass of this vessel, similar in type to the sketch in Fig. 1, and is being made by Messrs. Riggs & Brother, of Philadelphia.

Figs. 8 and 9 are views of the pilot-house binnacle referred to before, with the plan of compensating the semi-circular deviation. The standard compasses of the tugs *Fortune* and *Triton* were compensated as shown in Figs. 10 and 11.

These sketches have been appended in order to show how a neat compensation can be introduced into an ordinary binnacle with the resources available on board ship. It is the intention of the office to furnish each ship with wire magnets for purposes of compensation.

I beg leave to call your attention to the necessity for a careful consideration of the location of the wooden pilot-house or chart-house in the plans of the future vessels of the service, so that a proper distribution may be made of the local masses, such as conning towers, ventilators, galley-tanks and galley, anchor davits, etc., and the consequent forces that tend to disturb the steering compass reduced to a minimum.

In this connection I present certain facts concerning the *Baltimore*, showing the original problem of her steering compass and its solution, which, being similar in many respects to other vessels completed or building during the past year, may serve as an example of what should be avoided in future ships.

Preliminary observations for magnetic forces taken on the *Baltimore* in the position of the steering compass in the chart-house showed the presence of such a large disturbing force as rendered the compass at once practically useless for steering purposes. The original position of that compass, as defined by the steam-steering wheel in the chart-house, is shown in the sketch on Sheet B, with a graphic representation of the force produced by the steel fighting tower in close proximity.

The compass was placed at a distance of 23 inches abaft the shield protecting the entrance to the tower, the magnetic force of which, and the tower, composed of both permanent and variable magnetism, exerted an influence equal to 3.21 times that of the earth, which is the directing power of the compass-needle. It will be seen at once that the fighting-tower completely overcame the earth's action on the compass, and that without compensation the needle would always point to the tower instead of the magnetic north of the earth; in other words, the compass course would always show north, whatever might be the actual course steered.

Such was found to be the case in practice, and although an approximate correction was effected for the run of the *Baltimore* from Philadelphia to the Norfolk navy-yard, the remedy, besides being of a very powerful nature, could not be relied upon as a permanent correction when the variable disturbing force of the tower was to be considered—that is, the force due to magnetic induction in vertical iron.

The office set about adopting some method of improving the condition of things, and after a series of experiments and considerable correspondence, submitted to you from time to time, it was decided to move the wheel and compass as far aft in the house as the space would permit. An increase of several feet in the distance of the compass from the tower produced a reduction in force to 0.707 times the earth's force in the latitude of Norfolk, bringing the compass within fairly reasonable limits of compensation.

Although, as at present situated, it is not the best that could be desired for the working compass of the ship, still it admits of complete compensation by the use of the appliances provided in the service binnacle, together with one or two Flinder's bars, to be referred to later on. The new position of the steering compass is shown in the sketch, together with the ship's force acting on it.

After the solution of the *Baltimore's* difficulties, steps were taken to meet the requirements of the *Philadelphia*, *Newark*, and *San Francisco*, whose conditions were, in a measure, identical with those of the *Baltimore*, as determined by observations taken on each of those vessels.

The changes necessary to render their steering compasses efficient were submitted to you with the results of the observations, and the best that could be done under the circumstances has been accomplished, and it is confidently expected that the navigators of those vessels will have no trouble in keeping their compasses in order.

The later steel ships that have gone in commission in the past year have developed the question of compensation of compasses to an extent that illustrates the importance of a thorough knowledge of the subject on the part of the navigator. The office has been fortunate in obtaining very good data from several vessels, notably the *Charleston* and *Baltimore*, which can not fail to be both interesting and instructive to the service and will be published within the next year.

I append the example of the *Baltimore's* steering compass in detail, with graphic illustrations showing the changes that occur in its deviations as the ship cruises in different latitudes, together with the method of final compensation to render the compass approximately correct in all latitudes.

Original curves of deviations obtained by swinging ship in the latitudes of Cape Henry and Key West afforded sufficient data to separate the subpermanent magnetism from that due to vertical induction in soft iron and to determine the value of each.

On sheet C, Fig. 1, are given the dygograms of the steering compass, illustrating graphically the forces acting on the compass at various places in latitude, with the calculated increase at Portland, Me.—the tangents to the curves drawn from the point 0 to the scale of degrees showing the maximum deviation in each case, which, at Portland, Me., amounted to 69°. The corresponding Napier's curves are given on sheet E, annexed.

Presuming the compass to have been accurately compensated at Key West, Fla., the semicircular deviation wholly by means of magnets, the residual deviations as the ship went to Cape Henry and to Portland, Me., respectively, are shown by dygogram in Fig. 2, sheet C, and by Napier's curves on sheet F.

This gradually increasing deviation as the ship goes north is due to the induced magnetism in the surrounding vertical soft iron, presumably the conning tower, and in order to avoid the inconvenience and delay of frequent re-compensation, a Flinder's bar correction must be applied which can be readily effected by the aid of simple formulæ given in the theory of the deviations of the compass.

An analysis of the curves at Cape Henry and Key West gives the values of the semicircular co-efficients $\mathfrak{B}$ and $\mathfrak{C}$ at the two places, which co-efficients are affected by the change in latitude. Substituting their values and those of the other expressions that enter into the following formulæ:

$$\mathfrak{B}\,H = \frac{P}{\lambda} + H \tan \text{dip} \times \frac{c}{\lambda}, \qquad (1)$$

and

$$\mathfrak{C}\,H = \frac{Q}{\lambda} + H \tan \text{dip} \times \frac{f}{\lambda}, \qquad (2)$$

the value of the subpermanent magnetism and that due to vertical induction to head and to starboard can be obtained.

Example.—From the data found by swinging ship and those taken from the magnetic charts provided, we have

First. For the separation of the two parts of $\mathfrak{B}$,

at Cape Henry $\mathfrak{B} = +0.6973$; $H = 0.219$; tan dip (69°) $= 2.605$
at Key West $\mathfrak{B} = +0.39333$; $H = 0.3113$; tan dip (54° 20′) $= 1.3934$
whence from formula (1)

$$\frac{P}{\lambda} = +0.02641 \text{ and } \frac{c}{\lambda} = +0.22139.$$

Second. For the separation of the two parts of $\mathfrak{C}$,

at Cape Henry $\mathfrak{C} = -0.11913$; $H = 0.219$; tan dip (69°) $= 2.605$
at Key West $\mathfrak{C} = -0.0796$; $H = 0.3113$; tan dip (54° 20′) $= 1.3934$
whence from formula (2)

$$\frac{Q}{\lambda} = +0.02862 \text{ and } \frac{f}{\lambda} = -0.09588.$$

In order to compensate for each force by its appropriate corrector, in any latitude, New York, for instance, proceed as follows: by a transposition of the formulæ (1) and (2) given above, we have

$$(3)\ \mathfrak{B} = \frac{P}{\lambda H} + \frac{c}{\lambda} \tan \text{dip},$$

and

$$(4)\ \mathfrak{C} = \frac{Q}{\lambda H} + \frac{f}{\lambda} \tan \text{dip},$$

and by substitution of known values we obtain at New York from (3)

$$\mathfrak{B} = +0.14322 + 0.6951 = +0.8383,$$

wherein 0.14322 is the force to head due to subpermanent magnetism and +0.6951, the force to head due to induction in vertical soft iron; also at New York, from (4)

$$\mathfrak{C} = +0.15520. - 0.30103 = -0.14583,$$

wherein +0.1552 is the force to starboard due to subpermanent magnetism and −0.30103, the force to starboard due to vertical induction in soft iron.

From the above values we obtain the total magnetic force due to subpermanent magnetism, producing semicircular deviation, to be equal to 0.21118 acting in a starboard angle of 47° 18′, and the total force due to induction in vertical soft iron producing semicircular deviation, equal to 0.7575 acting in a starboard angle of 336° 35′.

To place the Flinder's bar.—In view of the larger proportion of the error of the compass being due to vertical iron, it is considered advisable to correct that part first. From an investigation of the forces and their direction with reference to the midship line of the ship, it would appear that the disturbance is caused either by the upper end of vertical iron forward and to port of the compass, or by the lower end of vertical iron abaft and to starboard of the compass, most likely the former and due to the fighting tower.

A practical method of placing the Flinder's bar, in this case, would be to find on shore in New York, in a place free from local, magnetic influence, the distance *x* at which the bar, when at right angles to the disturbed compass needle will produce a deviation of 43° 24′, the amount in arc corresponding to the disturbing force 0.7575.

Then, on board, place the bar at the distance *x* from the center of the compass, in a vertical position, with its upper end about 2 inches above the latter, and at an angle of 156° 55′ from the ship's head as an origin, this being opposite to the direction of the disturbing force. The remaining deviation, composed of semi-circular and quadrantal, should be corrected in the customary manner by magnets and spheres.

All errors due to the horizontal forces of the ship are now adjusted and the compass should be practically correct for all latitudes and will only require occasional attention to the heeling error, with the usual careful watch for chance errors due to change in the magnetism of the correctors and to extraneous influences.

Sheet D gives the diagram of the compass both before and after compensation by the Flinder's bar, and sheet G the Napier's curves for the same.

The sketches on sheet H illustrate graphically the amount and direction of the ship's forces in the positions of the compasses of the *Baltimore*, *San Francisco*, and *Charleston*, in terms of the earth's horizontal force taken as unity, and the distribution of the magnetism in the hull of the *Charleston* as determined by a magnetic survey made by the navigator.

No reports have been received during the year in regard to the influence of the dynamo upon the compass, but the office has not lost sight of the probable mischief it may create in some of the smaller vessels building, in which the compass will, of necessity, come within its influence.

The office has lacked both time and facilities for experimenting with the method of interposing electro-magnets to counteract the varying disturbing force of the dynamo, as advocated by R. Dobroff in Annalen der Hydrographie, etc., of the German Seewarte for 1889, a subject that will receive attention in the near future. This important feature of the compass question could be best solved by the introduction of dynamos of small external magnetic field on board ship, one of which in particular has been favorably reported upon by experts both in and out of the service.

At present the office has confined itself to the placing of compasses in two or three positions on board ship, but the necessity for a corrected compass in the fighting tower of each new cruiser and battle-ship is a matter of vital importance, as all ships should be equipped for fighting without requiring the navigator to expose himself unnecessarily to an enemy's fire while taking observations during action.

The great difficulty to be overcome in the correction of a tower compass has been the large quadrantal deviation produced by the tower, necessitating the introduction of correctors, which, besides producing mischievous errors in themselves, while correcting others, demand a space out of all proportion to that allotted, whether soft-iron spheres or the Peichl system of radial rods are used.

A valuable contribution by Lieut. H. Florian, of the Austrian navy, seems to overcome the difficulty heretofore experienced by means of the introduction of a single small magnet, appropriately manipulated and requiring little space. His suggestion will be experimented upon as soon as the necessary instrument can be obtained.

The following itemized table of the probable expenses of the compass office is submitted for the fiscal year ending June 30, 1892, and is based upon the requirements of the vessels mentioned, which it is presumed will be completed in that time:

Estimate of the number of instruments required and their cost, for the fiscal year ending June 30, 1892.

Title of vessel.	Compensating binnacles.	Cost.	Horizontal vibrating instruments.	Cost.	Vertical force instruments.	Cost.	Azimuth circles.	Cost.	7½-inch compasses.	Cost.
Maine	3	$600.00	1	$28.10	1	$34.15	2	$145.00	4	$340.00
Monterey	3	600.00	1	28.10	1	34.15	2	145.00	4	340.00
Cruiser No. 7	3	600.00	1	28.10	1	34.15	2	145.00	4	340.00
Cruiser No. 8	3	600.00	1	28.10	1	34.15	2	145.00	4	340.00
Cruiser No. 9	3	600.00	1	28.10	1	34.15	2	145.00	4	340.00
Cruiser No. 10	3	600.00	1	28.10	1	34.15	2	145.00	4	340.00
Cruiser No. 11	3	600.00	1	28.10	1	34.15	2	145.00	4	340.00
Practice vessel	2	400.00	1	28.10	1	34.15	2	145.00	3	255.00
Gun-boat No. 5	2	400.00	1	28.10	1	34.15	2	145.00	3	255.00
Gun-boat No. 6	2	400.00	1	28.10	1	34.15	2	145.00	3	255.00
Tug-boats (3)	*3	600.00	......	....	......	....	3	217.50	6	510.00

Title of vessel.	Boat compasses.	Cost.	Peloruses.	Cost.	Clinometers.	Cost.	Flinder's bars.	Cost.	Adjustable curve rulers.	Cost.	Total amount for each vessel.
Maine	10	$400.00	1	$29.69	1	$10.23	1	$6.00	1	$1.87	$1,505.04
Monterey	7	280.00	1	29.69	1	10.23	1	6.00	1	1.87	1,475.04
Cruiser No. 7	9	360.00	1	29.69	1	10.23	1	6.00	1	1.87	1,555.04
Cruiser No. 8	9	360.00	1	29.69	1	10.23	1	6.00	1	1.87	1,555.04
Cruiser No. 9	7	280.00	1	29.69	1	10.23	1	6.00	1	1.87	1,475.04
Cruiser No. 10	7	280.00	1	29.69	1	10.23	1	6.00	1	1.87	1,475.04
Cruiser No. 11	7	280.00	1	29.69	1	10.23	1	6.00	1	1.87	1,475.04
Practice vessel	7	280.00	1	29.69	1	10.23	......	....	1	1.87	1,184.04
Gun-boat No. 5	5	200.00	1	29.69	1	10.23	1	6.00	1	1.87	1,110.04
Gun-boat No. 6	5	200.00	1	29.69	1	10.23	1	6.00	1	1.87	1,110.04
Tug-boats (3)	6	240.00	......	....	......	....	......	....	......	....	1,567.50
Total	......	....	......	....	......	....	......	....	......	....	15,576.90

* One each.

An additional sum of $3,000 (estimated) will be necessary to cover the following requirements which come under the cognizance of this office and which can not be itemized, viz: Blank forms for compass reports of ships; repairs to binnacles, azimuth circles, and compasses;

new instruments for wooden ships; new instruments for compass office, to be used in experiments in magnetism and compensation.

RECAPITULATION.

Cost of instruments for new vessels	$15,576.90
Additional expenses, as above (submitted)	3,000.00
Total	18,576.90

The office is indebted to Lieut. G. W. Denfeld, at present attached to the *Thetis*, for excellent magnetic work done on the *Charleston* and *San Francisco*. His presence on the west coast relieved the office of considerable trouble in the installation of the compasses of those ships.

I also take pleasure in mentioning the valuable services rendered to the Bureau and the Navy by Ensign John Gibson, who has been associated with me in the office. His thorough knowledge of the subject and devotion to duty contributed largely to the satisfactory results of the past year.

Very respectfully,

S. W. B. DIEHL,
Lieutenant, U. S. Navy, Superintendent of Compasses.

The CHIEF OF BUREAU OF EQUIPMENT.

REPORT

OF

THE CHIEF OF THE BUREAU OF NAVIGATION.

BUREAU OF NAVIGATION, NAVY DEPARTMENT,
Washington, October 15, 1890.

SIR: I have the honor to submit herewith the annual report of the operations of the Bureau of Navigation for the past year, and copies of the reports of the Superintendent of the Naval Academy (marked A) and of the Hydrographer to the Bureau of Navigation (marked B).

The only important change in the prescribed routine of the Naval Academy has been the establishment of a department of discipline, through which proper weight is given to officer-like bearing and conduct, and to aptitude for the service when determining the final class standing of a naval cadet.

It is recommended that the act of Congress approved August 5, 1882, which provides that from those naval cadets "who successfully complete the six years' course appointments shall hereafter be made, as it is necessary to fill vacancies in the lower grades of the line and Engineer Corps of the Navy, and of the Marine Corps," shall be so amended as to require that all vacancies in the lower grade of the Pay Corps shall also be filled from graduates of the Naval Academy. Since the passage of the act mentioned 115 surplus naval cadets have been discharged. It is submitted that the education which the Government has given to these discharged graduates makes them better qualified to perform the duties of a Navy pay officer than persons taken from civil life.

Increased appropriations are needed for the hydrographic office, in order that it may meet the wants of mariners. It is a matter of regret that it has been necessary to reduce the issue of the pilot charts of the North Atlantic Ocean, and that pilot charts of the South Atlantic and the Pacific Oceans can not be published.

The surveying work of the *Ranger* on the coast of Lower California, and of the *Thetis* in the Pacific Ocean, has been temporarily suspended, these vessels having been needed to look after our interests in Central America.

The movements of and duties performed by the ships of the Navy are shown in the annexed table marked C.

The act of Congress making appropriations for the Navy, approved June 30, 1890, having transferred the naval war college and torpedo school from the Torpedo Station to Coasters' Harbor Island, plans for the college building are now being prepared.

The usual summer courses of instruction at the Torpedo Station and at the War College were omitted this year, as a sufficient number of officers to form a class could not be spared from other duties.

Some changes in the numbers of officers allowed to grades would be beneficial. Five rear admirals are needed at all times to command our squadrons abroad and at home, and for these there must be reliefs. The Light-House Board, the Board for the Examination of Officers for Promotion, and the Board of Construction, should each have an admiral for its chairman or president. The important stations at New York and San Francisco need rear admirals to command them. Under the requirements of sections 1497 and 1498 of the Revised Statutes, a board could not now be convened to examine a commodore for promotion if our foreign squadrons were commanded by rear admirals. Three of the squadrons are commanded by commodores who hold acting appointments as rear admirals.

A large number of ensigns are performing the duties of lieutenants, both afloat and ashore, and they should have the rank and receive pay commensurate with these duties.

The number of the engineer officers allowed by law is inadequate to perform the duties required of that corps.

It is therefore recommended that the following changes be made in the grades mentioned:

The number of rear-admirals to be increased from six to ten. The number of lieutenants (junior grade) to be increased from seventy-five to one hundred and fifty. The number of ensigns to be reduced from one hundred and eighty-one to one hundred and six. The number of chief engineers, with relative rank of lieutenant-commander, to be increased from forty-five to fifty. The number of passed assistant engineers, with relative rank of lieutenant and lieutenant (junior grade), to be increased from sixty (the number now allowed by law) to one hundred and twenty:—seventy-five to have the relative rank of lieutenant, and forty-five to have the relative rank of lieutenant (junior grade). The number of assistant engineers, with relative rank of ensign, to be reduced from forty (now allowed by law) to thirty.

Your attention is invited to the inequalities now existing in the pay of the officers of the Navy. Officers of the same rank or relative rank should receive the same pay, and juniors should not receive more pay than their seniors. Under the present laws it is not uncommon for the commandant of a shore station, necessarily the ranking officer at the station, to find himself receiving less pay than the captain of the receiving-ship at his station, and less than some of the heads of the staff departments in the navy-yard under his command. The inequality does not exist only in the case of the commandants, but exists in all grades, and is shown plainly in the grade of ensign and officers holding that relative rank.

When the graduates of the Naval Academy are assigned each year in the order of merit, to fill the vacancies in the lowest grades of the line and Engineer Corps of the Navy, and in the Marine Corps, the graduate assigned to the line as an ensign gets $1,200 per annum at sea; the graduate of the same class assigned to the Engineer Corps as an assistant engineer, with the relative rank of ensign, gets $1,700 per annum at sea; and the graduate of the same class assigned to the Marine Corps as second lieutenant, with the relative rank of ensign, gets $1,400 per annum at sea.

Similar differences exist also in the shore-duty pay of these officers; the ensigns on shore duty getting $1,000 per annum; the assistant engineer, $1,400 per annum; the second lieutenant of marines, $1,400 per annum and quarters.

Great inequalities also exist in the pay of officers of the same rank and corps at shore stations, where some are furnished with quarters and others are not.

It is easily understood that an officer who occupies a furnished Government house, for which he pays no rent and on which he is required to make no repairs, is much better paid for his services than an officer of the same rank who is obliged to use part of his pay to hire a house in a city.

It is recommended that officers on duty, not furnished with Government quarters, shall have quarters hired for them, a certain number of rooms to be allowed to each rank.

It is also recommended that sections 1485 and 1486 of the Revised Statutes, which give precedence to officers according to length of service, be repealed, and that all officers in the Navy shall take precedence according to the dates of their commissions. The present law frequently changes the precedence of officers and has an injurious effect upon discipline. It is believed that in no naval or military service, other than the United States Navy, is the date of an officer's commission valueless in determining his precedence.

In August, 1889, typhoid fever made its appearance on board the stationary training-ship *New Hampshire*, at Newport, and made it necessary to move the apprentices on shore, where they were temporarily quartered in tents on Coaster's Harbor Island. Subsequently arrangements were made for quartering them in a building built for a gymnasium, and for messing them in the building formerly used as the War College. They are still quartered and messed in this manner, as, in the opinion of the medical officers of the station, it was not advisable to requarter them on board of the *New Hampshire.*

Within the past month the *Richmond* has been ordered to Newport as stationary training-ship, and the *New Hampshire* has been sent to New London.

The cruising training-ships *Portsmouth* and *Jamestown* have made the usual winter and summer cruises to the West Indies and to Europe, but as these vessels accommodate only 135 apprentices each, the supply of those fitted for transfer to regular cruising-ships has been less than usual. This deficiency will be overcome as soon as the *Monongahela* and *Lancaster*, now being fitted as training-ships, shall be ready for service.

The period of instruction in the cruising training-ships has been increased to one year, with beneficial results. Large numbers of boys present themselves for enlistment as apprentices, but many are rejected for physical disqualifications, and some of those accepted fail to report. The average number enlisted annually falls below the number allowed by law, and the gain to the service has not been encouraging.

Many boys enter the Navy for the novelty of the life, of which they soon tire, and many are entered by their parents apparently with a view to having their boys educated and disciplined before putting them at other work.

The gunnery schools at Washington and Newport have been kept up, and additional efforts have been made to give our seamen the special training needed to fit them to properly handle the new material now found on board of our ships of war. A large amount of rifle and revolver practice has been added to the course with gratifying results, and it is hoped soon to add practice with rapid-fire and other guns. The torpedo-boat *Alarm* is being fitted for this purpose.

With a view to encouraging marksmanship in the service generally, results of target practice with all guns and arms are published quarterly, and money prizes are awarded to those who are most proficient.

Men who qualify as marksmen have that fact recorded upon their transfer papers when sent from one vessel to another.

It is hoped the recommendation made to the last Congress in regard to the enlistment, pay, and retirement of the apprentices and men of the Navy will receive favorable action and be the means of obtaining American crews for our vessels. In April last it was found that there were 7,516 enlisted men in the service; that of this number 3,997 were foreign born; that only 4,360 were citizens of the United States; that 2,756 had made no declaration of intention to become citizens of the United States; and that 1,282 were not residents of the United States.

It is recommended that section 2166 of the Revised Statutes be so amended that an enlisted man serving in the U. S. Navy may become a naturalized citizen of the United States in the same manner as now provided for enlisted men of the U. S. Army. A seaman-gunner in the Navy has recently been refused American citizenship in New York, notwithstanding he made his declaration in this city in April last. This man has served in the Navy seven years, holds a continuous-service certificate from the Navy Department and a certificate as a seaman-gunner, having successfully passed through the gunnery schools at Washington and Newport. If such men can not become citizens of the United States the country gains nothing by educating them.

The changes in the last few years in small arms and guns have necessitated changes in manuals and movements, to meet which the Bureau has had prepared instructions for infantry and artillery, which it hopes soon to issue to the service.

The increased work of the Department makes it necessary that each Bureau shall have an assistant of the same corps as its chief, and it is most desirable for the efficiency of the Bureaus that these assistants shall be authorized by law. Under section 178 of the Revised Statutes, the officers now on duty as senior assistants in the Bureaus have no authority to act in the absence of the chiefs of Bureaus.

The estimates for the support of the Bureau, the Naval Academy, and the Hydrographic Office for the fiscal year ending June 30, 1892, are also submitted, marked *D*.

Very respectfully,

F. M. RAMSAY.
Chief of Bureau.

HON. SECRETARY OF THE NAVY,
Washington, D. C.

O.

MOVEMENT OF SHIPS.

NORTH ATLANTIC SQUADRON.

Rear-Admiral **BANCROFT GHERARDI, U. S. N., *Commander-in-Chief.***

Name of vessel and ports visited.	Date of arrival.	Date of departure	Remarks.
Baltimore, U. S. flag-ship. Capt. W. S. SCHLEY, U. S. N., commanding.			
Philadelphia, Pa	....	Jan. 13, 1890	Put in commission at Cramp's ship-yard, Philadelphia, Pa., Jan. 7, 1890.
Navy-yard, Norfolk, Va	Jan. 15, 1890	Apr. 25, 1890	
Hampton Roads, Va	Apr. 25, 1890	Apr. 26, 1890	
Lynn Haven Bay, Va	Apr. 26, 1890	Apr. 27, 1890	
Hampton Roads, Va	Apr. 29, 1890	May 1, 1890	
Navy-yard, Norfolk, Va	May 1, 1890	May 5, 1890	
Hampton Roads, Va	May 5, 1890	May 7, 1890	
Annapolis Roads, Md	May 7, 1890	May 8, 1890	
Baltimore, Md	May 8, 1890	May 14, 1890	Visited Baltimore at request of the citizens of that city.
Annapolis Roads, Md	May 14, 1890	May 15, 1890	
Key West, Fla	May 20, 1890	May 25, 1890	Flag of commander-in-chief transferred to this vessel, May 24, 1890.
Off St. John's River, Fla	May 27, 1890	May 27, 1890	
Port Royal, S. C	May 28, 1890	June 5, 1890	
Charleston, S. C	June 5, 1890	June 8, 1890	Visited Charleston at request of the chamber of commerce of that city, accompanied by other ships of the squadron.
New York City	June 12, 1890	June 16, 1890	
Navy-yard, Norfolk, Va	June 17, 1890	June 21, 1890	Ordered to Portland, with other vessels of squadron, to participate in the ceremonies attending the reunion of the Society of the Army of the Potomac.
New York harbor	June 22, 1890	June 27, 1890	
Portland, Me	June 29, 1890	July 12, 1890	
Bath, Me	July 12, 1890	July 17, 1890	
Bar Harbor, Me	July 18, 1890	Aug. 4, 1890	
New York, N. Y	Aug. 6, 1890	Aug. 9, 1890	Conveyed the President and party from New York to Boston, to attend the reunion of the Grand Army of the Republic.
Nantucket, Mass	Aug. 10, 1890	Aug. 11, 1890	
Boston, Mass	Aug. 11, 1890	Aug. 14, 1890	Flag of commander-in-chief transferred Aug. 18 to the *Philadelphia*, and ship assigned to special duty.
New York, N. Y	Aug. 15, 1890	Aug. 23, 1890	Conveyed the remains of the late Capt. John Ericsson from New York to Stockholm, Sweden.
Stockholm, Sweden	Sept. 12, 1890	Sept. 23, 1890	
Kiel, Germany	Sept. 25, 1890	At Kiel, last report.	

NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Philadelphia. Capt. B. F. BRADFORD, U. S. N., commanding. Relieved Sept. 22, 1890, by Capt. F. RODGERS, U. S. N.			
Philadelphia, Pa	July 17, 1890	Aug. 5, 1890	Put in commission July 28, 1890.
Tompkinsville, S. I	Aug. 8, 1890	Aug. 12, 1890	
Navy-yard, New York	Aug. 12, 1890	Sept. 15, 1890	Assigned to North Alantic station as flag-ship, Aug. 18, 1890.
Clifton, S. I	Sept. 15, 1890	Sept. 24, 1890	
Gardiner's Bay, N. Y	Sept. 24, 1890	Sept. 27, 1890	
New London, Conn	Sept. 27, 1890	Sept. 30, 1890	
Gardiner's Bay, N. Y	Sept. 30, 1890		
Tomkinsville, S. I	Oct. 5, 1890		
Galena. Commander G. W. SUMNER, U. S. N., commanding.			
Navy-yard, New York		Dec. 3, 1889	At navy-yard, New York, last report.
Cape Haytien, Hayti	Dec. 9, 1889	Dec. 15, 1889	
Port-au-Prince, Hayti	Dec. 16, 1889	Dec. 30, 1889	
Cape Haytien, Hayti	Dec. 31, 1889	Jan. 13, 1890	Transferred flag to the U. S. steamer *Dolphin*.
St. Nicholas Mole, Hayti	Jan. 13, 1890	Jan. 15, 1890	
Gonaives, Hayt	Jan. 15, 1890	Jan. 18, 1890	
St. Mark's, Hayti	Jan. 18, 1890	Jan. 18, 1890	Cruising in Haytian waters for the protection of American interests.
Port-au-Prince, Hayti	Jan. 18, 1899	Jan. 21, 1890	
Gonaives, Hayti	Jan. 21, 1890	Feb. 10, 1890	
Port-au-Prince, Hayti	Feb. 11, 1890	Feb. 12, 1890	
St. Nicholas Mole, Hayti	Feb. 13, 1890	Feb. 14, 1890	
Matanzas, Cuba	Feb. 17, 1890	Feb. 25, 1890	
Havana, Cuba	Feb. 25, 1890	Mar. 4, 1890	
Key West, Fla	Mar. 5, 1890	Mar. 27, 1890	
Off Rebecca Shoals, Fla	Mar. 27, 1890	Mar. 29, 1890	
Key West, Fla	Mar. 29, 1890	Apr. 10, 1890	
Off Marquesas Key, Fla	Apr. 10, 1890	Apr. 12, 1890	
Florida Bay	Apr. 13, 1890	Apr. 14, 1890	
Off Rebecca Shoals, Fla	Apr. 14, 1890	Apr. 15, 1890	
Key West, Fla	Apr. 15, 1890	Apr. 25, 1890	
Havana, Cuba	Apr. 26, 1890	Apr. 26, 1890	
Key West, Fla	Apr. 27, 1890	May 25, 1890	
Port Royal, S. C	May 28, 1890	June 5, 1890	
Off Charleston, S. C	June 5, 1890	June 8, 1890	Visited Charleston at the request of the chamber of commerce of that city.
New York, N. Y	June 12, 1890	June 25, 1890	
Tomkinsville, S. I	June 25, 1890	July 1, 1890	
Navy-yard, New York	July 1, 1890		Put out of commission at the navy-yard, New York, July 23, 1890.
Dolphin. Commander CHARLES O'NEILL, U. S. N., commanding. Relieved Mar. 26, 1890, by Commander YATES STIRLING, U. S. N.			
New York, N. Y		Dec. 9, 1889	
St. Nicholas Mole, Hayti	Dec. 15, 1889	Dec. 15, 1889	
Port-au-Prince, Hayti	Dec. 16, 1889	Dec. 20, 1889	Admiral Gherardi transferred his flag to this vessel from the *Galena*.
St. Nicholas, Mole, Hayti	Dec. 21, 1889	Dec. 25, 1889	
Port-au-Prince, Hayti	Dec. 25, 1889	Dec. 28, 1889	
St. Nicholas Mole, Hayti	Dec. 29, 1889	Dec. 29, 1889	
Port-au-Prince, Hayti	Dec. 29, 1889	Jan. 6, 1890	
Cape Haytien, Hayti	Jan. 7, 1890	Jan. 9, 1890	
Port Royal, Jamaica	Jan. 10, 1890	Jan. 10, 1890	
Kingston, Jamaica	Jan. 10, 1890	Jan. 17, 1890	
Port Royal, Jamaica	Jan. 17, 1890	Jan. 18, 1890	
Navassa Island	Jan. 19, 1890	Jan. 19, 1890	
Port-au-Prince, Hayti	Jan. 20, 1890	Jan. 21, 1890	Conveyed the United States minister from Port-au-Prince to Santo Domingo for the presentation of his credentials to the Dominican Government.
Santo Domingo	Jan. 23, 1890	Jan. 27, 1890	
Santa Barbara	Jan. 28, 1890	Jan. 29, 1890	
Cape Haytien, Hayti	Jan. 30, 1890	Feb. 2, 1890	
St. Nicholas Mole, Hayti	Feb. 2, 1890	Feb. 2, 1890	
Gonaives, Hayti	Feb. 3, 1890	Feb. 3, 1890	

NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Dolphin—Continued.			
St. Mark's, Hayti	Feb. 3, 1890	Feb. 3, 1890	Cruising in Haytian waters.
Port-au-Prince, Hayti	Feb. 3, 1890	Feb. 5, 1890	
Gonaives, Hayti	Feb. 5, 1890	Feb. 13, 1890	
St. Nicholas Mole, Hayti	Feb. 13, 1890	Feb. 14, 1890	
Gonaives, Hayti	Feb. 14, 1890	Feb. 15, 1890	
Port-au-Prince, Hayti	Feb. 15, 1890	Feb. 21, 1890	
Port Royal, Jamaica	Feb. 22, 1890	Feb. 22, 1890	
Kingston, Jamaica	Feb. 22, 1890	Feb. 25, 1890	
Port Antonio, Jamaica	Feb. 26, 1890	Mar. 6, 1890	
Port au-Prince, Hayti	Mar. 7, 1890	Mar. 9, 1890	
Havana, Cuba	Mar. 12, 1890	Mar. 17, 1890	
Key West, Fla	Mar. 18, 1890	Mar. 27, 1890	
Do	Mar. 29, 1890	May 25, 1890	
Port Royal, S. C	May 28, 1890	June 4, 1890	
Charleston, S. C	June 5, 1890	June 8, 1890	Visited Charleston at request of chamber of commerce of that city.
New York, N. Y	June 12, 1890	June 23, 1890	
Southampton, Long Island, N. Y	June 24, 1890	June 26, 1890	
Vineyard Haven, Mass	June 26, 1890	June 28, 1890	Ordered to Portland to take part in the ceremonies attending the reunion of the Society of the Army of the Potomac.
Portland, Me	June 29, 1890	July 13, 1890	
Bath, Me	July 13, 1890	July 17, 1890	
Bar Harbor, Me	July 18, 1890	Aug. 6, 1890	
Provincetown, Mass	Aug. 7, 1890	Aug. 9, 1890	
Boston, Mass	Aug. 9, 1890	Aug. 16, 1890	
New York, N. Y	Aug. 18, 1890		
Kearsarge. Commander HORACE ELMER, U. S. N., commanding.			
Navy-yard, New York	....	Nov. 8, 1889	At navy-yard, New York, last report.
Woods Holl, Mass	Nov. 9, 1889	Nov. 11, 1889	
Kittery Point, Me	Nov. 12, 1889	Nov. 13, 1889	
New York Harbor, N. Y	Nov. 16, 1889	Nov. 17, 1889	
Navy-yard, New York	Nov. 17, 1889	Dec. 3, 1889	
Cape Haytien, Hayti	Dec. 9, 1889	Dec. 15, 1889	
Port-au-Prince, Hayti	Dec. 16, 1889	Dec. 19, 1889	
Gonaives, Hayti	Dec. 20, 1889	Jan. 2, 1890	
St. Nicholas Mole, Hayti	Jan. 2, 1890	Jan. 4, 1890	
Cape Haytien, Hayti	Jan. 3, 1890	Jan. 13, 1890	
Port-au-Prince, Hayti	Jan. 14, 1890	Jan. 14, 1890	
Gonaives, Hayti	Jan. 15, 1890	Jan. 18, 1890	
Port-au-Prince, Hayti	Jan. 18, 1890	Jan. 19, 1890	
Port Antonio, Jamaica	Jan. 21, 1890	Jan. 28, 1890	
Gonaives, Hayti	Jan. 29, 1890	Feb. 6, 1890	
Kingston, Jamaica	Feb. 8, 1890	Feb. 10, 1890	
Gonaives, Hayti	Feb. 12, 1890	Feb. 13, 1890	
St. Nicholas Mole, Hayti	Feb. 13, 1890	Feb. 14, 1890	
Matanzas, Cuba	Feb. 17, 1890	Feb. 25, 1890	
Havana, Cuba	Feb. 25, 1890	Mar. 4, 1890	
Key West, Fla	Mar. 5, 1890	Mar. 26, 1890	
Off Rebecca Shoal Light, Fla	Mar. 26, 1890	Mar. 29, 1890	
Key West, Fla	Mar. 29, 1890	May 25, 1890	
Port Royal, S. C	May 28, 1890	June 4, 1890	
Charleston, S. C	June 5, 1890	June 8, 1890	Visited Charleston at the request of chamber of commerce.
New York, N. Y	June 12, 1890	June 24, 1890	
Off South Hampton, Long Island	June 25, 1890	June 25, 1890	
New York, N. Y	June 26, 1890	June 27, 1890	Ordered to Portland to take part in the celebration attending the reunion of the Society of the Army of the Potomac.
Portland, Me	June 29, 1890	July 13, 1890	
Bath, Me	July 13, 1890	July 17, 1890	
Bar Harbor, Me	July 18, 1890	July 27, 1890	
New York, N. Y	July 29, 1890	Aug. 9, 1890	
Boston, Mass	Aug. 11, 1890	Aug. 16, 1890	
New York, N. Y	Aug. 18, 1890	Sept. 4, 1890	
Colon	Sept. 15, 1890	Sept. 22, 1890	
Greytown	Sept. 24, 1890	Sept. 25, 1890	Protecting American interests in Central America.
Colon	Sept. 27, 1890	Nov. 13, 1890	
Key West, Fla	Nov. 20, 1890	....	

NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Yantic. Commander C. H. ROCKWELL, U. S. N., commanding.			
Navy-yard, Norfolk, Va	....	Nov. 6, 1889	
Santiago de Cuba, Cuba	Nov. 14, 1889	Nov. 17, 1889	At sea, making passage to Santi Cuba, last report.
St. Nicholas Mole, Hayti	Nov. 18, 1889	Dec. 4, 1889	
Santiago de Cuba, Cuba	Dec. 5, 1889	Dec. 6, 1889	
St. Nicholas Mole, Hayti	Dec. 7, 1889	Dec. 7, 1889	
Port Plata, St. Domingo	Dec. 9, 1889	Dec. 9, 1889	
St. Nicholas Mole, Hayti	Dec. 10, 1889	Dec. 10, 1889	
El Portillo, Cuba	Dec. 14, 1889	Dec. 17, 1889	
Santiago de Cuba, Cuba	Dec. 18, 1889	Dec. 18, 1889	Engaged with expedition in det ing certain longitudes in the Indies.
St. Nicholas Mole, Hayti	Dec. 20, 1889	Dec. 21, 1889	
St. Domingo City, St. Domingo	Dec. 24, 1889	Dec. 27, 1889	
Santa Barbara (Samana), St. Domingo.	Dec. 29, 1889	Jan. 10, 1890	
Port Plata, St. Domingo	Jan. 11, 1890	Jan. 11, 1890	
Curaçao, West Indies	Jan. 17, 1890	Jan. 31, 1890	
La Guayra, Venezuela	Feb. 2, 1890	Feb. 6, 1890	
Los Roques, Venezuela	Feb. 7, 1890	Feb. 9, 1890	
La Guayra, Venezuela	Feb. 10, 1890	Feb. 17, 1890	
Curaçao, West Indies	Feb. 18, 1890	Feb. 18, 1890	
St. Domingo City, St. Domingo	Feb. 21, 1890	Feb. 21, 1890	
Key West, Fla	Mar. 7, 1890	Apr. 10, 1890	
Do	Apr. 12, 1890	Apr. 17, 1890	
New York, N. Y	Apr. 28, 1890	June 14, 1890	Detached from duty on the Nort lantic station May 27, 1890, a signed to special duty under th reau of Navigation.
Gardiner's Bay (Long Island) N. Y.	June 17, 1890	June 19, 1890	
New York, N. Y	June 19, 1890	June 23, 1890	Destroyed wreck off Absecom L
New London, Conn	June 26, 1890	July 10, 1890	
Chatham Roads, Mass	July 10, 1890	July 21, 1890	
New London, Conn	July 22, 1890	July 22, 1890	
New York, N. Y	July 23, 1890	....	
Petrel. Lieut. Commander W. H. BROWNSON, U. S. N., commanding.			
Navy-yard, Norfolk, Va	....	Mar. 25, 1890	Put in commission at the navy- Norfolk, Va., Dec. 10, 1889.
Hampton Roads, Va	Mar. 25, 1890	Mar. 26, 1890	For inspection by board of insp and survey.
Do	Mar. 26, 1890	Mar. 27, 1890	
Navy-yard, Norfolk, Va	Mar. 27, 1890	June 10, 1890	Assigned to duty in North At squadron June 10, 1890.
Hampton Roads, Va	June 10, 1890	June 13, 1890	
New York, N. Y	June 15, 1890	June 23, 1890	
Montauk Point, N. Y	June 24, 1890	June 26, 1890	
Vineyard Haven, Mass	June 26, 1890	June 28, 1890	
Portland, Me	June 29, 1890	July 12, 1890	At Portland, Me., to take part ceremonies attending the reu the society of the Army of the mac.
Bath, Me	July 12, 1890	July 17, 1890	
Bar Harbor, Me	July 18, 1890	Aug. 6, 1890	
Provincetown, Mass	Aug. 7, 1890	Aug. 9, 1890	
Boston, Mass	Aug. 9, 1890	Aug. 21, 1890	
Tompkinsville (Staten Island), N. Y.	Aug. 22, 1890	Aug. 22, 1890	
New York, N. Y	....do	Aug. 31, 1890	
Falkner's Island (Long Island), N. Y.	Aug. 31, 1890	Sept. 2, 1890	
Long Island Shoal	Sept. 2, 1890	Sept. 3, 1890	
Gardiner's Bay	Sept. 3, 1890	Sept. 5, 1890	
New London, Conn	Sept. 8, 1890	Sept. 9, 1890	
Do	Sept. 9, 1890	Sept. 17, 1890	
Newport, R. I	Sept. 17, 1890	Sept. 25, 1890	
Gardiner's Bay	Sept. 25, 1890	Sept. 27, 1890	
New London, Conn	Sept. 27, 1890	Sept. 30, 1890	
Gardiner's Bay	Sept. 30, 1890	....	
Vesuvius. Lieut. S. SCHROEDER, U. S. N., commanding.			
Philadelphia, Pa	....	June 18, 1890	Put in commission at Philade June 2, 1890.

NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Vesuvius.—Continued.			
New York, N. Y	June 19, 1890	....	
Do	June 26, 1890	Oct. 1, 1890	Reported to Rear-Admiral Bancroft Gherardi for duty on North Atlantic station.
Gardiner's Bay	Oct. 1, 1890	Oct. 2, 1890	
Newport, R. I	Oct. 2, 1890	Oct. 16, 1890	
New York, N. Y	Oct. 16, 1890	....	

SOUTH ATLANTIC STATION.

Rear-Admiral JAMES H. GILLIS, U. S. N., *Commander-in-Chief.*

Richmond, U. S. flag-ship. Capt. A. V. REED, U. S. N., commanding.			
Buenos Ayres, Argentine Republic.	....	Oct. 17, 1889	At Buenos Ayres, Argentine Republic, last report.
Montevideo, Uruguay	Oct. 18, 1889	Nov. 22, 1889	
Rio de Janeiro, Brazil	Nov. 28, 1889	Dec. 4, 1889	
Bahia, Brazil	Dec. 14, 1889	Jan. 6, 1890	
Montevideo, Uruguay	Jan. 19, 1890	Feb. 10, 1890	Cruising in South American waters.
Maldonado, Uruguay	Feb. 11, 1890	Mar. 6, 1890	
Montevideo, Uruguay	Mar. 7, 1890	Apr. 21, 1890	
Enseñado, Argentine Republic	Apr. 22, 1890	May 6, 1890	Ordered to Norfolk, Va., May 3, 1890.
Montevideo, Uruguay	May 8, 1890	May 19, 1890	
Bahia, Brazil	May 29, 1890	June 2, 1890	
Bridgetown, Barbadoes	June 15, 1890	June 17, 1890	
Hampton Roads, Va	June 28, 1890	June 30, 1890	
Norfolk, Va	June 30, 1890	July 5, 1890	
Fortress Monroe, Va	July 5, 1890	Aug. 28, 1890	
Norfolk, Va	Aug. 28, 1890	Oct. 2, 1890	
Newport, R. I	Oct. 7, 1890	Oct. 11, 1890	
New London, Conn	Oct. 12, 1890	Oct. 18, 1890	
Newport, R. I	Oct. 18, 1890	....	
Tallapoosa. Commander J. M. FORSYTH, U.S.N., commanding.			
Montevideo, Uruguay	....	Oct. 26, 1889	At Montevideo, Uruguay, last report.
Colonia, Uruguay	Oct. 27, 1889	Oct. 27, 1889	
Montevideo, Uruguay	Oct. 28, 1889	Nov. 30, 1889	
Maldonado, Uruguay	Nov. 30, 1889	Dec. 12, 1889	
Montevideo, Uruguay	Dec. 13, 1889	Feb. 15, 1890	
Maldonado, Uruguay	Feb. 15, 1890	Feb. 19, 1890	
Montevideo, Uruguay	Feb. 20, 1890	Feb. 24, 1890	
Maldonado, Uruguay	Feb. 25, 1890	Mar. 1, 1890	
Montevideo, Uruguay	Mar. 2, 1890	Mar. 3, 1890	
Maldonado, Uruguay	Mar. 4, 1890	Mar. 6, 1890	
Montevideo, Uruguay	Mar. 7, 1890	Mar. 8, 1890	
Indio Point light ship	Mar. 8, 1890	Mar. 9, 1890	
Montevideo, Uruguay	Mar. 9, 1890	Apr. 21, 1890	
Buenos Ayres, Argentine Republic	Apr. 22, 1890	Apr. 22, 1890	
Rosario, Argentine Republic	Apr. 27, 1890	Apr. 29, 1890	
Draineutt, Argentine Republic	Apr. 30, 1890	May 6, 1890	
Rosario, Argentine Republic	May 6, 1890	May 11, 1890	
Montevideo, Uruguay	May 13, 1890	May 29, 1890	
Buenos Ayres, Argentine Republic	June 3, 1890	....	
Pensacola,[*] Capt. A. R. YATES, U. S. N., commanding. Relieved June 14, 1890, by Capt. ALBERT KAUTZ, U. S. N.			
Fayal, Azores	Nov. 2, 1889	Nov. 3, 1889	At sea making passage to St. Paul de Loando with expedition to observe the eclipse of the sun.
Porto Grande, Cape de Verde Islands.	Nov. 10, 1889	Nov. 12, 1889	
Sierra Leone, Africa	Nov. 18, 1889	Nov. 20, 1889	
Cape Coast Castle	Nov. 26, 1889	Nov. 26, 1889	
Elmina, Gold Coast	Nov. 26, 1889	Nov. 28, 1889	
St. Paul de Loando	Dec. 6, 1889	Dec. 7, 1889	

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[*] Rear-Admiral W. P. McCann hoisted his flag on this vessel on Aug. 4, 1890, preparatory to taking command of South Atlantic station.

SOUTH ATLANTIC STATION—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Pensacola.—Continued.			
Cape Ledo Angola	Dec. 8, 1889	Dec. 27, 1889	
St. Paul de Loando	Dec. 28, 1889	Jan. 3, 1890	
Cape Town, South Africa	Jan. 17, 1890	Feb. 6, 1890	
St. Helena Island	Feb. 20, 1890	Mar. 10, 1890	
Georgetown, Ascension Island	Mar. 16, 1890	Apr. 8, 1890	
Bridgetown, Barbadoes	Apr. 28, 1890	May 10, 1890	
Murray's Anchorage, Bermuda	May 18, 1890	May 19, 1890	
New York, N. Y	May 23, 1890	Aug. 31, 1890	Sailed for South Atlantic station Aug 31, 1890.
Funchal, Madeira	Sept. 18, 1890	Sept. 27, 1890	
St. Vincent, Cape de Verde's	Oct. 4, 1890	Oct. 6, 1890	
Bahia, Brazil	Oct. 21, 1890	....	
Essex. Commander A. S. SNOW, U. S. N., commanding.			
Portland, Me	June 30, 1890	July 8, 1890	At navy-yard, N. Y., last report. Put in commission April 22, 1890. Ordered to Portland to take part in the ceremonies attending the reunion of the Society of the Army of the Potomac.
New York, N. Y	July 10, 1890	Aug. 16, 1890	Sailed to join South Atlantic station.
Porto Grande, Cape de Verde	Sept. 10, 1890	Sept. 16, 1890	
Bahia, Brazil	Oct. 2, 1890	....	

EUROPEAN STATION.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Enterprise. Commander B. H. MCCALLA, U.S.N., commanding until put out of commission.			
Brixham Roads, England	....	Nov. 2, 1889	At Brixham Roads, England, last report.
Dartmouth	Nov. 2, 1889	Nov. 11, 1889	
Torquay	Nov. 11, 1889	Nov. 11, 1889	
Cowes	Nov. 12, 1889	Nov. 12, 1889	
Southampton	Nov. 12, 1889	Nov. 18, 1889	
Cowes	Nov. 18, 1889	Nov. 18, 1889	
Dartmouth	Nov. 19, 1889	Nov. 20, 1889	
Gibraltar, Spain	Nov. 26, 1889	Nov. 28, 1889	
Negro Bay	Nov. 28, 1889	Nov. 28, 1889	
Gibraltar	Nov. 29, 1889	Nov. 29, 1889	
Centa	Nov. 29, 1889	Nov. 29, 1889	
Negro Bay	Nov. 29, 1889	Nov. 30, 1889	
Centa	Nov. 30, 1889	Nov. 30, 1889	
Villefranche	Dec. 4, 1889	Dec. 21, 1889	
Gibraltar	Dec. 25, 1889	Dec. 25, 1889	
Lisbon	Dec. 26, 1889	Dec. 31, 1889	
Plymouth	Jan. 4, 1890	Jan. 10, 1890	
Flushing, Holland	Jan. 11, 1890	Jan. 12, 1890	
Antwerp, Belgium	Jan. 12, 1890	Jan. 16, 1890	Conveyed the remains of the late Minister Pendleton from Antwerp to New York.
Teignmouth, England	Jan. 18, 1890	Jan. 19, 1890	
Dartmouth, England	Jan. 19, 1890	Jan. 26, 1890	
Do	Jan. 26, 1890	Jan. 28, 1890	
Madeira	Feb. 3, 1890	Feb. 8, 1890	
Bermuda	Feb. 22, 1890	Feb. 24, 1890	
New York	Feb. 27, 1890	Sept. 24, 1890	Put out of commission at navy-yard, New York, May 20, 1890.
Enterprise. Commander G. A. CONVERSE, U. S. N., commanding.			
Gardiner's Bay	Sept. 25, 1890	Sept. 27, 1890	Recommissioned at navy-yard, New York, July 8, 1890. Reported to Rear-Admiral Bancroft Gherardi for duty on North Atlantic station.
New London, Conn	Sept. 27, 1890	Sept. 30, 1890	
Gardner's Bay	Oct. 1, 1890	Oct. 3, 1890	
New London, Conn	Oct. 3, 1890	Oct. 7, 1890	
Gardner's Bay	Oct. 7, 1890	Oct. 10, 1890	
Tompkinsville, S. I.	Oct. 11, 1890	....	

SQUADRON OF EVOLUTION.

Rear-Admiral John G. Walker, U. S. N., commander-in-chief.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Chicago, U.S. Flag-ship. Capt. H. B. Robeson, U. S. N., commanding.			
Boston, Mass		Dec. 7, 1889	At navy-yard, Boston, last report.
Lisbon, Portugal	Dec. 21, 1889	Dec. 31, 1889	
Tangiers, Morocco	Jan. 2, 1890	Jan. 5, 1890	
Gibraltar, Spain	Jan. 5, 1890	Jan. 16, 1890	
Cartagena, Spain	Jan. 17, 1890	Jan. 20, 1890	
Port Mahon, Minorca Island	Jan. 22, 1890	Feb. 3, 1890	
Toulon, France	Feb. 4, 1890	Feb. 11, 1890	
Villefranche, France	Feb. 11, 1890	Mar. 1, 1890	
Spezia, Italy	Mar. 2, 1890	Mar. 6, 1890	
Naples, Italy	Mar. 8, 1890	Mar. 23, 1890	
Corfu, Greece	Mar. 25, 1890	Apr. 15, 1890	
Valetta, Island of Malta	Apr. 17, 1890	Apr. 30, 1890	
Algiers, Algeria	May 3, 1890	May 8, 1890	
Gibraltar, Spain	May 10, 1890	May 26, 1890	
Tangier, Morocco	May 26, 1890	May 27, 1890	
Funchal, Madeira	May 30, 1890	May 31, 1890	
Porto Grande, Cape de Verde Islands.	June 5, 1890	June 7, 1890	
Bahia, Brazil	June 17, 1890	June 19, 1890	
Rio de Janeiro, Brazil	June 23, 1890	July 5, 1890	
Port Castries, San Lucia, West Indies.	July 20, 1890	July 22, 1890	
New York, N. Y	July 29, 1890		Took part at New York in the ceremonies attending the embarkation of the remains of the late Capt. John Ericsson for Sweden, Aug. 23, and is at present at the navy-yard at that place for repairs.
Boston. Capt. James O'Kane, U. S. N., commanding.			
Boston, Mass		Dec. 7, 1889	At Boston, last report.
Lisbon, Portugal	Dec. 21, 1890	Dec. 31, 1889	
Tangier, Morocco	Jan. 2, 1890	Jan. 5, 1890	
Gibraltar, Spain	Jan. 5, 1890	Jan. 16, 1890	
Cartagena, Spain	Jan. 17, 1890	Jan. 20, 1890	
Port Mahon, Minorca Island	Jan. 22, 1890	Feb. 3, 1890	
Toulon, France	Feb. 4, 1890	Feb. 11, 1890	
Villefranche, France	Feb. 11, 1890	Mar. 1, 1890	
Genoa, Italy	Mar. 2, 1890	Mar. 6, 1890	
Naples, Italy	Mar. 8, 1890	Mar. 23, 1890	
Corfu, Greece	Mar. 25, 1890	Apr. 13, 1890	
Messina, Italy	Apr. 14, 1890	Apr. 19, 1890	
Valetta, Island of Malta	Apr. 19, 1890	Apr. 30, 1890	
Algiers, Algeria	May 3, 1890	May 8, 1890	
Gibraltar, Spain	May 10, 1890	May 26, 1890	
Tangier, Morocco	May 26, 1890	May 27, 1890	
Funchal, Madeira	May 30, 1890	May 31, 1890	
Porto Grande, Cape de Verde Islands.	June 4, 1890	June 7, 1890	
Bahia, Brazil	June 17, 1890	June 19, 1890	
Rio de Janeiro, Brazil	June 23, 1890	July 5, 1890	
Port Castries, San Lucia, West Indies.	July 21, 1890	July 23, 1890	
New York, N. Y	July 29, 1890		Took part at New York in the ceremonies attending the embarkation of the remains of the late Capt. John Ericsson for Sweden, Aug. 23, and is at present at the navy-yard at that place for repairs.
Atlanta. Capt. John A. Howell, U. S. N., commanding.			
Boston, Mass		Dec. 7, 1889	At Boston, last report.
Lisbon, Portugal	Dec. 21, 1889	Dec. 31, 1880	
Tangiers, Morocco	Jan. 2, 1890	Jan. 5, 1890	
Gibraltar, Spain	Jan. 5, 1890	Jan. 16, 1890	
Cartagena, Spain	Jan. 17, 1890	Jan. 20, 1890	
Port Mahon, Minorca Island	Jan. 22, 1890	Feb. 3, 1830	
Toulon, France	Feb. 4, 1890	Feb. 11, 1890	
Villefranche, France	Feb. 11, 1890	Mar. 1, 1890	
Genoa, Italy	Mar. 2, 1890	Mar. 6, 1890	
Naples, Italy	Mar. 8, 1890	Mar. 23, 1890	
Corfu, Greece	Mar. 25, 1890	Apr. 13, 1890	
Messina, Italy	Apr. 14, 1890	Apr. 22, 1890	
Valetta, Malta	Apr. 23, 1890	Apr. 30, 1890	

SQUADRON OF EVOLUTION—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Atlanta—Continued.			
Algiers, Algeria	May 3, 1890	May 8, 1890	
Gibraltar, Spain	May 10, 1890	May 26, 1890	
Tangier, Morocco	May 26, 1890	May 27, 1890	
Funchal, Madeira	May 30, 1890	May 31, 1890	
Porto Grande, Cape de Verde Islands.	June 4, 1890	June 7, 1890	
Bahia, Brazil	June 17, 1890	June 19, 1890	
Rio de Janeiro, Brazil	June 23, 1890	July 5, 1890	
Port Castries, San Lucia, West Indies.	July 20, 1890	July 22, 1890	
New York, N. Y	July 29, 1890	Aug. 9, 1890	Ordered to Boston to participate in the ceremonies attending the reunion of the Grand Army of the Republic.
Boston, Mass	Aug. 11, 1890	Aug. 16, 1890	
New York, N. Y	Aug. 18, 1890	Sept. 20, 1890	
Norfolk, Va	Sept. 22, 1890	....	Took part at New York in the ceremonies attending the embarkation of the remains of the late Capt. John Ericsson for Sweden, Aug. 23. At present at navy-yard, Norfolk, Va., for repairs.
Yorktown. Commander F. E. CHADWICK, U. S. N., commanding.			
Boston, Mass	....	Dec. 7, 1889	At Boston last report.
Horta, Fayal Island, Azores	Dec. 18, 1889	Dec. 20, 1889	
Lisbon, Portugal	Dec. 23, 1889	Dec. 31, 1889	
Tangier, Morocco	Jan. 2, 1890	Jan. 5, 1890	
Gibraltar, Spain	Jan. 5, 1890	Jan. 16, 1890	
Cartagena, Spain	Jan. 17, 1890	Jan. 20, 1890	
Port Mahon, Island of Minorca	Jan. 22, 1890	Feb. 3, 1890	
Toulon, France	Feb. 4, 1890	Feb. 11, 1890	
Villefranche, France	Feb. 11, 1890	Mar. 1, 1890	
Spezia, Italy	Mar. 2, 1890	Mar. 7, 1890	
Leghorn, Italy	Mar. 7, 1890	Mar. 12, 1890	
Castellamore, Italy	Mar. 13, 1890	Mar. 23, 1890	
Corfu, Greece	Mar. 25, 1890	Apr. 15, 1890	
Valetta, Malta	Apr. 17, 1890	Apr. 30, 1890	
Algiers, Algeria	May 3, 1890	May 8, 1890	
Gibraltar, Spain	May 10, 1890	May 26, 1890	
Tangier, Morocco	May 26, 1890	May 27, 1890	
Funchal, Madeira	May 30, 1890	May 31, 1890	Ordered to New York for repair of steering gear.
Porto Grande, Cape de Verde Islands	June 4, 1890	June 7, 1890	
New York, N. Y	June 17, 1890	Aug. 9, 1890	From July 1 to Aug. 8, in dock at navy-yard, N. Y., being repaired.
Boston, Mass	Aug. 10, 1890	Aug. 16, 1890	
New York, N. Y	Aug. 18, 1890	Sept. 14, 1890	Aug. 23 took part in the ceremonies attending the embarkation of the remains of the late Capt. John Ericsson for Sweden.
New London, Conn	Sept. 15, 1890	Sept. 17, 1890	
Gardiner's Bay	Sept. 17, 1890	Sept. 18, 1890	
New London, Conn	Sept. 18, 1890	Sept. 19, 1890	
Gardiner's Bay	Sept. 19, 1890	Sept. 20, 1890	
New London, Conn	Sept. 20, 1890	Sept. 22, 1890	
Gardiner's Bay	Sept. 22, 1890	Sept. 24, 1890	
New York, N. Y	Sept. 25, 1890	....	

PACIFIC SQUADRON.

Rear Admiral GEORGE BROWN, U. S. N., *Commander-in-Chief.*

Charleston, U. S. Flagship, Capt. GEO. C. REMEY, U. S. N., Commanding.			
Navy-yard, Mare Island, Cal	....	Apr. 10, 1890	Put in commission at the navy-yard Mare Island, Cal., Dec. 26, 1889.
San Francisco, Cal	Apr. 10, 1890	Apr. 12, 1890	
Santa Cruz, Cal	Apr. 12, 1890	Apr. 13, 1890	Rear-Admiral George Brown relieved Admiral Kimberly in command of the U. S. naval force on the Pacific Station and hoisted his flag on board this vessel at the navy-yard, Mare Island, Cal.
Monterey, Cal	Apr. 13, 1890	Apr. 20, 1890	
San Francisco, Cal	Apr. 20, 1890	May 10, 1890	

PACIFIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Charleston—Continued.			
Sausalito, Cal	May 10, 1890	May 21, 1890	
Honolulu, Hawaiian Islands	May 29, 1890	Aug. 7, 1890	At Honolulu for the protection of American interests.
Port Townsend, Wash	Aug. 22, 1890	Aug. 23, 1890	
Seattle, Wash	Aug. 23, 1890	Aug. 30, 1890	
Port Townsend	Aug. 30, 1890	Sept. 1, 1890	
Honolulu, Hawaiian Islands	Sept. 12, 1890	....	
Iroquois. Commander J. BISHOP, U. S. N., commanding.			
Honolulu, Hawaiian Islands	....	Nov. 20, 1889	At Honolulu, last report.
Jaluit, Marshall Islands	Dec. 6, 1889	Dec. 10, 1889	
Butaritari, Gilbert Islands	Dec. 12, 1889	Dec. 21, 1889	
Port Townsend, Wash	Mar. 10, 1890	Mar. 19, 1890	While en route to the Samoan Islands, engines became disabled and ship proceeded under sail to Port Townsend.
Port Angeles Harbor, Wash	Mar. 19, 1890	Mar. 20, 1890	
San Francisco, Cal	Mar. 25, 1890	Mar. 26, 1890	
Navy-yard, Mare Island, Cal	Mar. 26, 1890	June 14, 1890	
Navy-yard, Mare Island, Cal	June 16, 1890	June 21, 1890	
Honolulu, Hawaiian Islands	July 3, 1890	July 12, 1890	
Pago Pago, Samoan Islands	July 26, 1890	Aug. 3, 1890	
Apia, Samoan Islands	Aug. 4, 1890	Aug. 8, 1890	
Pago Pago, Samoan Islands	Aug. 13, 1890	Aug. 14, 1890	
Apia, Samoan Islands	Aug. 16, 1890	Aug. 16, 1890	
Pago Pago, Samoan Islands	Aug. 17, 1890	Aug. 21, 1890	
Honolulu, Hawaiian Islands	Sept. 7, 1890	....	
Adams. Lieut. Commander J. J. HUNKER, U. S. N., commanding. Relieved April 28, 1890, by Commander JAMES G. GREEN, U. S. N.			
Apia, Samoan Islands	....	Sept. 13, 1889	At Apia, Samoa, last report.
Apia, Samoan Islands	Sept. 14, 1889	Sept. 29, 1889	
Pago Pago, Samoan Islands	Sept. 30, 1889	Oct. 5, 1889	
Off West Cape, Samoan Islands	Oct. 5, 1889	Oct. 7, 1889	
Apia, Samoan Islands	Oct. 8, 1889	Oct. 10, 1889	In Samoan waters for the protection of American interests.
Pago Pago, Samoan Islands	Oct. 12, 1889	Oct. 14, 1889	
Apia, Samoan Islands	Oct. 15, 1889	Oct. 29, 1889	
Saluafata, Samoan Islands	Oct. 29, 1889	Nov. 1, 1889	
Pago Pago, Samoan Islands	Nov. 1, 1889	Nov. 3, 1889	
Off West Cape, Samoan Islands	Nov. 3, 1889	Nov. 5, 1889	
Apia, Samoan Islands	Nov. 5, 1889	Nov. 8, 1889	
Pago Pago, Samoan Islands	Nov. 9, 1889	Nov. 16, 1889	
Apia, Samoan Islands	Nov. 16, 1889	Dec. 6, 1889	
Pago Pago, Samoan Islands	Dec. 8, 1889	Dec. 14, 1889	
Apia, Samoan Islands	Dec. 14, 1889	Jan. 13, 1890	
Pago Pago, Samoan Islands	Jan. 13, 1890	Jan. 20, 1890	
Apia, Samoan Islands	Jan. 20, 1890	Jan. 28, 1890	
Pago Pago, Samoan Islands	Jan. 29, 1890	Feb. 1, 1890	
Apia, Samoan Islands	Feb. 1, 1890	Feb. 8, 1890	
Apia, Samoan Islands	Feb. 8, 1890	Feb. 12, 1890	
Pago Pago, Samoan Islands	Feb. 12, 1890	Feb. 19, 1890	
Pago Pago, Samoan Islands	Feb. 20, 1890	Feb. 24, 1890	
Apia, Samoan Islands	Feb. 24, 1890	Feb. 27, 1890	
Saluafata, Samoan Islands	Feb. 27, 1890	Feb. 28, 1890	
Pago Pago, Samoan Islands	Mar. 1, 1890	Mar. 26, 1890	
Apia, Samoan Islands	Mar. 26, 1890	Mar. 28, 1890	
Pago Pago, Samoan Islands	Mar. 29, 1890	Apr. 11, 1890	
Saluafata, Samoan Islands	Apr. 11, 1890	Apr. 12, 1890	
Apia, Samoan Islands	Apr. 12, 1890	Apr. 19, 1890	
Hubner Bay, Samoan Islands	Apr. 20, 1890	Apr. 24, 1890	
Off Leone Point, Samoan Islands	Apr. 24, 1890	Apr. 25, 1890	
Apia, Samoan Islands	Apr. 25, 1890	Apr. 28, 1890	
Pago Pago, Samoan Islands	Apr. 29, 1890	May 2, 1890	
Honolulu, Hawaiian Islands	May 19, 1890	June 9, 1890	
San Francisco, Cal	June 24, 1890	June 25, 1890	
Navy-yard, Mare Island, Cal	June 25, 1890	....	Put out of commission July 31, 1890.
Alert. Commander JAMES G. GREEN, U. S. N., commanding.			
Honolulu, Hawaiian Islands	....	Nov. 21, 1889	At Honolulu, Hawaiian Islands, last report.

PACIFIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Alert—Continued.			
San Francisco, Cal	Dec. 9, 1889	Dec. 10, 1889	
Navy-yard, Mare Island, Cal	Dec. 10, 1889		Put out of commission at navy-yard, Mare Island, Feb. 6, 1890. Recommissioned Oct. 9, 1890.
Nipsic. Lieut. Commander H. W. LYON, U. S. N., commanding. Relieved Apr. 14, 1890, by Commander FELIX MCCURLEY, U. S. N.			
Honolulu, Hawaiian Islands		Jan. 3, 1890	Repairing at Honolulu, Hawaiian Islands, last report.
Lahaina, Hawaiian Islands	Jan. 8, 1890	Jan. 17, 1890	
Honolulu, Hawaiian Islands	Jan. 18, 1890	Mar. 24, 1890	Has remained in Hawaiian Islands for the protection of American interests.
Hilo, Hawaiian Islands	Mar. 26, 1890	Apr. 1, 1890	
Lahaina, Hawaiian Islands	Apr. 2, 1890	Apr. 2, 1890	
Honolulu, Hawaiian Islands	Apr. 3, 1890	June 14, 1890	Left for cruise among the islands.
Do	July 3, 1890	Sept. 9, 1890	
San Francisco, Cal	Sept. 30, 1890	Oct. 2, 1890	
Navy-yard, Mare Island, Cal	Oct. 2, 1890		Put out of commission Oct. 29, 1890.
Monongahela. Commander GEORGE E. WINGATE, U. S. N., commanding. Relieved Feb. 8, 1890, by Lieut. Commander W. C. GIBSON, U. S. N.			
San Francisco, Cal		Oct. 29, 1889	At San Francisco last report.
Navy-yard, Mare Island, Cal	Oct. 30, 1889	Mar. 10, 1890	Detached from Pacific Squadron Jan. 25, 1890.
New York, N. Y	June 25, 1889	July 15, 1890	
Navy-yard, Portsmouth, N. H	July 19, 1889		Put out of commission Sept. 19, 1890. Is being fitted out at navy-yard, Portsmouth, N. H., as an apprentice training-ship.
Ranger. Lieut. Commander GEORGE C. REITER, U. S. N., commanding. Relieved Nov. 6, 1890, by Commander Geo. E. Wingate, U. S. N.			
Mare Island navy-yard, Cal		Nov. 6, 1889	At Mare Island, Cal., last report.
San Diego, Cal	Nov. 8, 1889	Nov. 14, 1889	Ship engaged in surveying on the coast of Lower California.
Mare Island navy-yard, Cal	Apr. 3, 1890	July 11, 1890	
San Francisco, Cal	July 11, 1890	July 12, 1890	
Acapulco, Mexico	July 23, 1890	July 24, 1890	Protecting American interests in Central America.
San José de Guatemala, Central America.	July 28, 1890	Aug. 19, 1890	
Acajulta, San Salvador	Aug. 20, 1890	Aug. 22, 1890	
San José, Guatemala	Aug. 23, 1890	Aug. 24, 1890	
Acajulta, San Salvador	Aug. 25, 1890	Aug. 25, 1890	
San José, Guatemala	Aug. 26, 1890	Sept. 30, 1890	Assigned to Pacific Station, Sept. 15, 1890.
Acajulta, San Salvador	Oct. 1, 1890		

ASIATIC SQUADRON.

Rear-Admiral George E. Belknap, U. S. N., Commander-in-Chief.

Omaha. U. S. flag-ship. Capt. B. J. CROMWELL, U. S. N., commanding.			
Nagasaki, Japan		Oct. 8, 1889	At Nagasaki, Japan, last report.
Chemulpo, Corea	Oct. 10, 1889	Oct. 23, 1889	
Chefoo, China	Oct. 24, 1889	Oct. 28, 1889	
Nagasaki, Japan	Oct. 30, 1889	Nov. 15, 1889	
Yokohama, Japan	Nov. 21, 1889	Mar. 28, 1890	An extensive fire having occurred on shore in the native town of Hodogaya, a suburb of Kanagawa, on the night of February 8, a detachment of officers and men was landed from the *Omaha* at the request of the United States consul-general and rendered excellent service in checking the flames. The assistance rendered was cordially acknowledged by the governor of Kanagawa.

ASIATIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Omaha—Continued.			
Kobe, Japan	Apr. 2, 1890	May 9, 1890	
Nagasaki, Japan	May 11, 1890	June 28, 1890	
Kobe, Japan	June 30, 1890	June 30, 1890	
Yokohama, Japan	July 2, 1890		
Marion. Commander N. M. DYER, U. S. N., commanding.			
Chemulpo, Corea		Feb. 11, 1890	At Chemulpo, Corea, last report.
Shanghai, China	Feb. 15, 1890	Feb. 23, 1890	
Nagasaki, Japan	Feb. 26, 1890	Mar. 6, 1890	
Yokohama, Japan	Mar. 11, 1890	Mar. 24, 1890	
San Francisco, Cal	May 1, 1890	May 2, 1890	
Navy-yard, Mare Island, Cal	May 2, 1890		Put out of commission at the navy yard, Mare Island, May 23, 1890.
Swatara. Commander JOHN McGOWAN, U. S. N., commanding. Relieved March 17, 1890, by Commander PHILIP H. COOPER, U. S. N.			
Hong-Kong, China		Nov. 23, 1889	At Hong-Kong, China, last report.
Hai Tan Island, China	Nov. 26, 1889	Nov. 29, 1889	
Matsu Island	Nov. 29, 1889	Nov. 30, 1889	
Flat Island	Nov. 30, 1889	Dec. 1, 1889	
Chin Quan Island	Dec. 1, 1889	Dec. 2, 1889	
Nagasaki, Japan	Dec. 7, 1889	Jan. 12, 1890	
Yokohama, Japan	Jan. 16, 1890	Jan. 29, 1890	
Kobe, Japan	Feb. 1, 1890	Feb. 4, 1890	
Chemulpo, Corea	Feb. 10, 1890	Feb. 23, 1890	
Nagasaki, Japan	Feb. 25, 1890	Mar. 6, 1890	
Chemulpo, Corea	Mar. 9, 1890	Apr. 9, 1890	
Kobe, Japan.	Apr. 13, 1890	Apr. 16, 1890	
Yokohama, Japan	Apr. 14, 1890	Apr. 24, 1890	Conveyed the newly appointed minister of the United States to Corea, and his family, from Yokohama to Chemulpo.
Kobe, Japan	Apr. 26, 1890	May 1, 1890	
Chemulpo, Corea	May 5, 1890	May 13, 1890	
Chefoo, China	May 15, 1890	May 17, 1890	
Shanghai, China	May 20, 1890	May 28, 1890	
Nagasaki, Japan	May 30, 1890	June 2, 1890	
Chemulpo, Corea	June 5, 1890	Aug. 30, 1890	
Chefoo, China	Sept. 2, 1890	Sept. 14, 1890	
Kobe, Japan	Sept. 20, 1890	Sept. 20, 1890	
Yokohama, Japan	Sept. 24, 1890	Oct. 29, 1890	Flag of Commander-in-Chief temporarily transferred to *Swatara*, Oct. 4, 1890. En route to San Francisco, Cal.
Mohican. Commander J. B. COGHLAN, U. S. N., commanding. Relieved February 15, 1890, by Commander E. M. SHEPARD, U. S. N.			
Honolulu, Hawaiian Islands		Dec. 28, 1889	At Honolulu last report.
Lahaina, Hawaiian Islands	Dec. 28, 1889	Jan. 2, 1890	
Honolulu, Hawaiian Islands	Jan. 3, 1890	Apr. 8, 1890	
Pago-Pago, Samoan Islands	Apr. 26, 1890	May 8, 1890	
Apia, Samoan Islands	May 9, 1880	May 17, 1890	
Apia, Samoan Islands	May 19, 1890	May 22, 1890	
Pago-Pago, Samoan Islands	May 23, 1890	May 24, 1890	In Samoan waters for the protection of American interests.
Apia, Samoan Islands	May 25, 1890	May 25, 1890	
Saluafata, Samoan Islands	May 25, 1890	May 28, 1890	
Pago-Pago, Samoan Islands	May 29, 1890	June 5, 1890	
Apia, Samoan Islands	June 6, 1890	June 18, 1890	
Pago-Pago, Samoan Islands	June 19, 1890	June 26, 1890	
Apia, Samoan Islands	June 27, 1890	July 22, 1890	
Mataatu, Samoan Islands	July 23, 1890	July 24, 1890	
Pago Pago, Samoan Islands	July 25, 1890	July 29, 1890	
Siwa Fiji	Aug. 2, 1890	Aug. 5, 1890	
Nonmea, New Caledonia	Aug. 12, 1890	Aug. 16, 1890	
Sidney, N. S. Wales	Aug. 22, 1890	Aug. 30, 1890	
Auckland, N. Z.	Sept. 5, 1890	Aug. 9, 1890	
Russell, N. Z.	Sept. 12, 1890	Aug. 17, 1890	
Apia, Samoa	Sept. 26, 1890	Aug. 26, 1890	

ASIATIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Mohican—Continued.			
Pago Paga, Samoan Islands	Sept. 27, 1890	Oct. 1, 1890	
Papute, Tahiti	Oct. 11, 1890	Oct. 16, 1890	
Honolulu, Samoan Islands	Nov. 11, 1890	....	
Monocacy. Commander M. L. JOHNSON, U. S. N., commanding.			
Yokohama, Japan	....	Dec. 12, 1889	At Yokohama, Japan, last report.
Yokosuka, Japan	Dec. 12, 1889	Dec. 13, 1889	Went to the assistance of the Pacific steamer *China*, which had grounded in Yokohama Harbor, and succeeded in getting her afloat.
Feruye, Japan	Dec. 18, 1889	Dec. 20, 1889	
Nagasaki, Japan	Dec. 20, 1889	Dec. 21, 1889	
Shanghai, China	Dec. 24, 1889	Jan. 2, 1890	
Chinkiang, China	Jan. 3, 1890	Jan. 10, 1890	
Hankow, China	Jan. 14, 1890	Jan. 19, 1890	
Kiukiang, China	Jan. 20, 1890	Jan. 24, 1890	
Wuhu, China	Jan. 26, 1890	Jan. 29, 1890	
Chinkiang, China	Jan. 29, 1890	Feb. 3, 1890	
Nankin, China	Feb. 3, 1890	Feb. 7, 1890	
Chinkiang, China	Feb. 7, 1890	Feb. 14, 1890	Placed at the disposition of the United States consul to visit Viceroy Tseng at Nankin.
Shanghai, China	Feb. 15, 1890	Mar. 1, 1890	
Amoy, China	Mar. 4, 1890	Mar. 9, 1890	
Swatow, China	Mar. 10, 1890	Mar. 15, 1890	
Hong-Kong, China	Mar. 16, 1890	Mar. 29, 1890	
Canton, China	Mar. 29, 1890	May 3, 1890	
Hong-Kong, China	May 3, 1890	May 4, 1890	
Nagasaki, Japan	May 9, 1890	May 18, 1890	Placed at the disposition of the United States minister to China for the purpose of visiting several ports within his jurisdiction, and attending to official business.
Shanghai, China	May 21, 1890	May 27, 1890	
Canton, China	June 1, 1890	June 8, 1890	
Hong-Kong, China	June 9, 1890	June 13, 1890	
Amoy, China	June 15, 1890	June 18, 1890	
Pagoda Anchorage, China	June 19, 1890	June 23, 1890	
Chinkiang, China	June 26, 1890	June 29, 1890	
Shanghai, China	July 1, 1890	July 5, 1890	Hon. Charles Denby, United States minister to China, and his secretary of legation on board, visiting the several ports of China.
Newchwang, China	July 9, 1890	July 11, 1890	
Taku, China	July 12, 1890	July 12, 1890	
Chefoo, China	July 14, 1890	July 21, 1890	
Shanghai, China	July 24, 1890	Aug. 22, 1890	
Chefoo, China	Aug. 25, 1890	....	
Alliance. Commander H. C. TAYLOR, U. S. N., assumed command January 16, 1890			
Navy yard, Norfolk, Va	....	Feb. 17, 1890	Put in commission January 16, 1890, for service on the Asiatic Station.
Hampton Roads, Va	Feb. 17, 1890	Feb. 22, 1890	
Navy yard, Norfolk, Va	Feb. 22, 1890	Mar. 6, 1890	
Hampton Roads, Va	Mar. 6, 1890	Mar. 8, 1890	
Murray's Anchorage, Bermuda	Mar. 14, 1890	Mar. 16, 1890	En route to Asiatic Station.
Malaga, Spain	Apr. 2, 1890	Apr. 6, 1890	
Gibraltar, Spain	Apr. 6, 1890	Apr. 22, 1890	
Tangier, Morocco	Apr. 22, 1890	Apr. 24, 1890	
Gibraltar, Spain	Apr. 24, 1890	Apr. 24, 1890	
Messina, Sicily	Apr. 30, 1890	May 6, 1890	
Alexandria, Egypt	May 11, 1890	May 19, 1890	
Port Said, Egypt	May 20, 1890	May 21, 1890	
Suez, Egypt	May 22, 1890	May 23, 1890	
Aden, Arabia	May 30, 1890	May 31, 1890	
Colombo, Ceylon	June 11, 1890	June 22, 1890	
Penang, Malay Peninsula	June 29, 1890	July 1, 1890	
Singapore, Malacca Straits	July 4, 1890	July 5, 1890	Reported to Rear Admiral George B. Belknap for duty on Asiatic station.
Hong Kong, China	July 14, 1890	July 21, 1890	
Amoy, China	July 24, 1890	July 27, 1890	
Kobe, Japan	Aug. 3, 1890	Aug. 6, 1890	

ASIATIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Alliance—Continued.			
Yokohama, Japan	Aug. 8, 1890	Aug. 25, 1890	In dock for repairs.
Kobe, Japan	Aug. 27, 1890	Sept. 12, 1890	
Yokosuka, Japan	Sept. 14, 1890	Sept. 22, 1890	
Yokohama, Japan	Sept. 22, 1890	Sept. 25, 1890	
Ponape, Caroline Islands	....	....	
Palos. Lieut. Commander JOSEPH E. CRAIG, U. S. N., commanding. Relieved March 29, 1890, by Lieut. Commander HOLMAN VAIL, U. S. N. Relieved July 10, 1890, by Lieut. T. S. PHELPS, jr., U. S. N.			
Nagasaki, Japan	....	Jan. 13, 1890	
Ningpo, China	Jan. 16, 1890	Jan. 27, 1890	
Chin Hae, China	Jan. 27, 1890	Jan. 27, 1890	
Shanghai, China	Jan. 29, 1890	Feb. 12, 1890	
Chinkiang, China	Feb. 13, 1890	Apr. 21, 1890	
Hankow, Yangtse River	Apr. 24, 1890	May 5, 1890	
Kiukiang, Yangtse River	May 5, 1890	May 11, 1890	
Nganking, Yangtse River	May 11, 1890	May 12, 1890	
Wuhu, Yangtse River	May 12, 1890	May 15, 1890	
Nankin, Yangtse River	May 15, 1890	May 16, 1890	
Chinkiang, Yangtse River	May 16, 1890	May 16, 1890	
Shanghai, China	May 17, 1890	May 22, 1890	
Nagasaki, Japan	May 25, 1890	June 9, 1890	
Off Roze Island, Korea	June 12, 1890	June 16, 1890	
Nagasaki, Japan	June 18, 1890	July 2, 1890	
Kobe, Japan	July 6, 1890	Aug. 24, 1890	
Chemulpo, Korea	Aug. 28, 1890	....	

SHIPS EMPLOYED ON SPECIAL DUTY.

Pinta. Lieut. Commander O. C. FARENHOLT, U. S. N., Commanding.			
Sitka, Alaska	....	Apr. 23, 1890	At Sitka, Alaska, last report.
Killisnoo, Alaska	Apr. 23, 1890	Apr. 25, 1890	Ship in winter quarters from October 17, 1889, to April 23, 1890.
Fresh Water Bay, Alaska	Apr. 25, 1890	Apr. 25, 1890	
Hoonah, Alaska	Apr. 25, 1890	Apr. 27, 1890	
Pyramid Harbor, Alaska	Apr. 27, 1890	Apr. 30, 1890	
Sava Inlet, Alaska	Apr. 30, 1890	Apr. 30, 1890	
Sitka, Alaska	May 1, 1890	May 21, 1890	
White-water Bay, Alaska	May 21, 1890	May 22, 1890	
Security Bay, Alaska	May 22, 1890	May 22, 1890	
Cleveland Passage, Alaska	May 22, 1890	May 23, 1890	
Portage Bay, Alaska	May 23, 1890	May 23, 1890	
Port Protection, Alaska	May 23, 1890	May 24, 1890	
Shakan, Alaska	May 24, 1890	May 25, 1890	
Red Bay, Alaska	May 25, 1890	May 25, 1890	
Salmon Bay, Alaska	May 25, 1890	May 25, 1890	
Ratz Harbor, Alaska	May 25, 1890	May 26, 1890	
Tolstoi Bay, Alaska	May 26, 1890	May 26, 1890	
Karta Bay, Alaska	May 26, 1890	May 26, 1890	
Skorol Village, Alaska	May 26, 1890	May 26, 1890	
Ward Cove, Alaska	May 26, 1890	May 26, 1890	
Tongass Narrows, Can'y, Alaska	May 26, 1890	May 27, 1890	
Loring, Alaska	May 27, 1890	May 28, 1890	
McDonald's Bay, Alaska	May 28, 1890	May 29, 1890	
Burroughs Bay, Alaska	May 29, 1890	May 29, 1890	
Fort Tongass, Alaska	May 29, 1890	May 30, 1890	
Port Simpson, British Columbia	May 30, 1890	May 31, 1890	
Horokan, Alaska	May 31, 1890	June 1, 1890	
Port Chester, Alaska	June 1, 1890	June 2, 1890	
Union Bay, Alaska	June 2, 1890	June 2, 1890	
Ratz Harbor, Alaska	June 2, 1890	June 3, 1890	
Fort Wrangell, Alaska	June 3, 1890	June 5, 1890	
Cleveland Passage, Alaska	June 5, 1890	June 6, 1890	
Juneau, Alaska	June 8, 1890	June 8, 1890	
Bartlett Bay, Alaska	June 8, 1890	June 9, 1890	
Sitka, Alaska	June 9, 1890	June 25, 1890	
Port Mulgrave, Alaska	June 26, 1890	June 30, 1890	
Sitka, Alaska	Aug. 8, 1890	....	

SHIPS EMPLOYED ON SPECIAL DUTY—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Thetis. Lieut. Commander C. H. STOCKTON, U. S. N., Commanding.			
Sitka, Alaska		Oct. 29, 1889	At Sitka, last report.
Lindenberg Harbor, Alaska	Oct. 29, 1889	Oct. 30, 1889	
Killisnoo, Alaska	Oct. 30, 1889	Oct. 31, 1889	
Hoonyah, Alaska	Oct. 31, 1889	Oct. 31, 1889	
William Henry Bay, Alaska	Oct. 31, 1889	Nov. 1, 1889	
Pyramid Bay, Alaska	Nov. 1, 1889	Nov. 2, 1889	
Portage Bay, Alaska	Nov. 2, 1889	Nov. 2, 1889	
Juneau, Alaska	Nov. 3, 1889	Nov. 8, 1889	
Sitka, Alaska	Nov. 9, 1889	Nov. 20, 1889	
Favorite Anchorage, Alaska	Nov. 20, 1889	Nov. 21, 1889	
Security Bay, Alaska	Nov. 21, 1889	Nov. 22, 1889	
Wrangell Narrows (south entrance)	Nov. 22, 1889	Nov. 23, 1889	
Lowe Inlet, British Columbia	Nov. 24, 1889	Nov. 25, 1889	
Klemtoo Anchorage, British Columbia	Nov. 25, 1889	Nov. 26, 1889	
Safety Cove, British Columbia	Nov. 26, 1889	Nov. 27, 1889	
Alert Bay, British Columbia	Nov. 27, 1889	Nov. 27, 1889	
Departure Bay, British Columbia	Nov. 28, 1889	Nov. 30, 1889	
San Francisco, Cal	Dec. 7, 1889	Dec. 12, 1889	
Navy yard, Mare Island, Cal	Dec. 12, 1889	July 12, 1890	Protecting American interest Central America.
San José, Guatemala	July 27, 1890	Aug. 6, 1890	
Acajulta, San Salvador	Aug. 7, 1890	Aug. 7, 1890	
La Libertad, San Salvador	Aug. 7, 1890	Aug. 12, 1890	
Acajulta, San Salvador	Aug. 12, 1890	Aug. 13, 1890	
San José, Guatemala	Aug. 14, 1890	Aug. 18, 1890	
Acajulta, San Salvador	Aug. 19, 1890	Aug. 19, 1890	
La Union, San Salvador	Aug. 20, 1890	Aug. 23, 1890	
Amapala, Honduras	Aug. 23, 1890	Aug. 25, 1890	
La Libertad, San Salvador	Aug. 26, 1890	Aug. 26, 1890	
San José, Guatemala	Aug. 27, 1890	Sept. 18, 1890	
Acapulco, Mexico	Sept. 21, 1890	Sept. 27, 1890	
San José, Guatemala	Oct. 2, 1890		
Despatch. Lieut. WILLIAM S. COWLES, U. S. N., commanding.			
Washington navy-yard		Dec. 5, 1889	At navy-yard, Washington, D. C. report.
Hampton Roads, Va	Dec. 6, 1889	Dec. 7, 1889	Engaged in wrecking lumber sch *Joseph Saulter;* searching for w near Body's Island.
Norfolk navy-yard	Dec. 16, 1889	Dec. 16, 1889	
Do	Dec. 18, 1889	Dec. 29, 1889	
Washington navy-yard	Dec. 30, 1889	Jan. 4, 1890	
Hampton Roads, Va	Jan. 5, 1890	Jan. 5, 1890	
Newport News, Va	do	do	Members of International Marine ference on board.
Norfolk navy-yard	do	Jan. 6, 1890	
Washington navy-yard	Jan. 7, 1890	Mar. 15, 1890	
Hampton Roads, Va	Mar. 19, 1890	Mar. 19, 1890	
Norfolk navy-yard	do	Mar. 20, 1890	
Washington navy-yard	Mar. 22, 1890	Apr. 18, 1890	Pan-American Delegates on boar
Hampton Roads, Va	Apr. 16, 1890	Apr. 20, 1890	
Norfolk, Va	Apr. 20, 1890	do	
Washington navy-yard	Apr. 21, 1890	Apr. 23, 1890	
Mount Vernon	Apr. 23, 1890	do	
Washington navy-yard	do	May 8, 1890	
Mount Vernon	May 8, 1890	do	
Washington navy-yard	do	May 15, 1890	
Hampton Roads, Va	May 16, 1890	May 17, 1890	
Norfolk navy-yard	May 17, 1890	May 18, 1890	
Washington navy-yard	May 19, 1890	May 23, 1890	
Mount Vernon	May 23, 1890	do	
Washington navy-yard	do	May 24, 1890	
Do	May 26, 1890	June 6, 1890	
Hampton Roads, Va	June 7, 1890	June 8, 1890	
Washington navy-yard	June 9, 1890	June 16, 1890	
West Point, Va	June 17, 1890	June 17, 1890	Guests to dedication of York Monument.
Yorktown, Va	do	do	
West Point, Va	do	June 18, 1890	
Washington navy-yard	June 19, 1890	June 24, 1890	Destroyed wreck off Body's Islan
Hampton Roads, Va	June 25, 1890	June 26, 1890	
Norfolk navy-yard	June 26, 1890	do	Draft of men from Washington Norfolk to New York.
New York navy-yard	June 27, 1890	July 2, 1890	

SHIPS EMPLOYED ON SPECIAL DUTY—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Despatch—Continued.			
New London, Conn	July 3, 1890	July 6, 1890	
New York, N. Y	July 7, 1890	July 29, 1890	
New London, Conn	July 29, 1890	July 31, 1890	
Portsmouth, N. H	Aug. 1, 1890	Aug. 2, 1890	
Castine, Me	Aug. 2, 1890	Aug. 3, 1890	
Jericho Bay	Aug. 3, 1890	Aug. 4, 1890	
Bar Harbor, Me	Aug. 4, 1890	Aug. 7, 1890	
Sullivan Harbor	Aug. 7, 1890	....do	
Bar Harbor, Me	....do	Aug. 11, 1890	
Boston, Mass	Aug. 12, 1890	Aug. 13, 1890	
Bar Harbor, Me	Aug. 14, 1890	Aug. 18, 1890	
Wood's Holl	Aug. 19, 1890	Aug. 20, 1890	
Newport, R. I	Aug. 20, 1890	Aug. 21, 1890	
New York, N. Y	Aug. 21, 1890	Sept. 15, 1890	
Washington, D. C	Sept. 17, 1890	Oct. 8, 1890	
Mount Vernon	Oct. 8, 1890	....do	
Washington, D. C	....do		
Fortune. Lieut. Commander A. J. IVERSON, U. S. N., commanding.			
Portsmouth, N. H	Sept. 30, 1889	Oct. 7, 1889	Employed in conveying freight between the several navy-yards and stations.
Boston, Mass	Oct. 7, 1889	Oct. 10, 1889	
Newport, R. I	Oct. 11, 1889	Oct. 12, 1889	
New York, N. Y	Oct. 13, 1889	Oct. 21, 1889	
Norfolk, Va	Oct. 22, 1889	Oct. 25, 1889	
Annapolis, Md	Oct. 26, 1889	Oct. 28, 1889	
Washington, D. C	Oct. 29, 1889	Nov. 2, 1889	
Norfolk, Va	Nov. 4, 1889	Nov. 5, 1889	
New York, N. Y	Nov. 6, 1889	Nov. 13, 1889	
Newport, R. I	Nov. 14, 1889	Nov. 15, 1889	
Boston, Mass	Nov. 16, 1889	Nov. 20, 1889	
Portsmouth, N. H	Nov. 21, 1889	Dec. 3, 1889	
Boston, Mass	Dec. 3, 1889	Dec. 11, 1889	
Newport, R. I	Dec. 13, 1889	Dec. 13, 1889	
New Haven, Conn	Dec. 14, 1889	Dec. 15, 1889	
New York, N. Y	Dec. 15, 1889	Dec. 21, 1889	
Norfolk, Va	Dec. 22, 1889	Dec. 24, 1889	
Annapolis, Md	Dec. 25, 1889	Dec. 26, 1889	
Washington, D. C	Dec. 27, 1889	Jan. 3, 1890	
Norfolk, Va	Jan. 4, 1890	Jan. 7, 1890	
New York, N. Y	Jan. 11, 1890	Jan. 18, 1890	
Newport, R. I	Jan. 18, 1890	Jan. 21, 1890	
Boston, Mass	Jan. 22, 1890	Jan. 28, 1890	
Portsmouth, N. H	Jan. 28, 1890	Feb. 4, 1890	
Boston, Mass	Feb. 4, 1890	Feb. 7, 1890	
Newport, R. I	Feb. 8, 1890	Feb. 10, 1890	
Boston, Mass	Feb. 11, 1890	Feb. 17, 1890	
Provincetown Harbor	Feb. 19, 1890	Feb. 23, 1890	
Newport, R. I	Feb. 23, 1890	Feb. 24, 1890	
New York, N. Y	Feb. 26, 1890	Mar. 4, 1890	
Philadelphia, Pa	Mar. 6, 1890	Mar. 8, 1890	
Norfolk, Va	Mar. 9, 1890	Mar. 12, 1890	
Washington, D. C	Mar. 13, 1890	Mar. 15, 1890	
Norfolk, Va	Mar. 16, 1890	Mar. 16, 1890	
Washington, D. C	Mar. 18, 1890	Mar. 25, 1890	
Norfolk, Va	Mar. 26, 1890	Mar. 28, 1890	
New York, N. Y	Mar. 30, 1890	Apr. 2, 1890	
Newport, R. I	Apr. 2, 1890	Apr. 3, 1890	
Boston, Mass	Apr. 3, 1890	Apr. 29, 1890	
New York, N. Y	May 1, 1890	May 3, 1890	
Washington, D. C	May 5, 1890	May 12, 1890	
Norfolk, Va	May 13, 1890	May 15, 1890	
New York, N. Y	May 16, 1890	May 20, 1890	
Boston, Mass	May 21, 1890	May 22, 1890	
Portsmouth, N. H	May 22, 1890	May 24, 1890	
Boston, Mass	May 24, 1890	June 4, 1890	
Newport, R. I	June 5, 1890	June 5, 1890	
New York, N. Y	June 6, 1890	June 8, 1890	
Washington, D. C	June 10, 1890	June 14, 1890	
Norfolk, Va	June 15, 1890	June 18, 1890	
Philadelphia, Pa	June 19, 1890	June 25, 1890	
New York, N. Y	June 26, 1890	June 28, 1890	
Newport, R. I	June 28, 1890	June 30, 1890	
Boston, Mass	July 1, 1890	July 8, 1890	
Portsmouth, N. H	July 8, 1890	July 16, 1890	
New York, N. Y	July 19, 1890	July 26, 1890	

SHIPS EMPLOYED ON SPECIAL DUTY—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Fortune—continued.			
Portsmouth, N. H	July 29, 1890	Aug. 4, 1890	
New York, N. Y	Aug. 6, 1890	Aug. 9, 1890	
Boston, Mass	Aug. 10, 1890	....	
Portsmouth. N. H	Aug. 20, 1890	Aug. 21, 1890	
New York, N. Y	Aug. 25, 1890	Aug. 28, 1890	
Norfolk, Va	Aug. 30, 1890	....	
Washington, D. C	Aug. 31, 1890	Sept. 6, 1890	
Norfolk, Va	Sept. 7, 1890	Sept. 9, 1890	
New York, N. Y	Sept. 10, 1890	....	
Newport, R. I	Sept. 17, 1890	Sept. 18, 1890	
Boston, Mass	Sept. 19, 1890	Sept. 30, 1890	
Portsmouth, N. H	Sept. 30, 1890	Oct. 4, 1890	
Boston, Mass	Oct. 4, 1890	Oct. 8, 1890	
Newport, R. I	Oct. 9, 1890	....	
New York, N. Y	Oct. 10, 1890	Oct. 13, 1890	
Newfolk, Va	Oct. 14, 1890	Oct. 14, 1890	
Washington, D. C	Oct. 15, 1890	Oct. 22, 1890	
Annapolis, Md	Oct. 24, 1890	....	
Cushing. Lieut. C. McR. WINSLOW, U. S. N., commanding.			
Cruising back and forth between Washington and Boston.	....	....	Put in commission at Newport, April 22, 1890.
Michigan. Capt. HENRY F. PICKING, U. S. N., commanding. Relieved Nov. 16, 1889, by Commander G. H. WADLEIGH, U. S. N.			
Cleveland, Ohio	....	Oct. 1, 1889	Cruising on Northwestern lakes ing past year.
Erie, Pa	Oct. 1, 1889	Oct. 3, 1889	
Buffalo, N. Y	Oct. 3, 1889	Oct. 7, 1889	
Erie, Pa	Oct. 7, 1889	....	In winter quarters.
Erie, Pa	....	May 27, 1890	
Cleveland, Ohio	May 27, 1890	June 4, 1890	
Erie, Pa	June 4, 1890	June 14, 1890	
Buffalo, N. Y	June 14, 1890	July 10, 1890	
Put-in-Bay, Ohio	July 11, 1890	July 14, 1890	
Erie, Pa	July 15, 1890	Aug. 2, 1890	
Detroit, Mich	Aug. 3, 1890	Aug. 15, 1890	
Port Huron, Mich	Aug. 15, 1890	Aug. 16, 1890	
Mackinac Island, Mich	Aug. 17, 1890	Aug. 21, 1890	
Beaver Island, Hb	Aug. 21, 1890	Aug. 22, 1890	
Escanaba, Hb	Aug. 22, 1890	Aug. 26, 1890	
Green Bay, Wis	Aug. 26, 1890	Aug. 30, 1890	
Sturgeon Bay, Wis	Aug. 30, 1890	Aug. 31, 1890	
Milwaukee, Wis	Sept. 1, 1890	Sept. 9, 1890	
Chicago, Ill	Sept. 9, 1890	Sept. 25, 1890	
Michigan City, Ind	Sept. 25, 1890	Sept. 28, 1890	
Sand Beach, Mich	Sept. 30, 1890	....	
Detroit, Mich	Oct. 2, 1890	....	
Erie, Pa	Oct. 12, 1890	....	
Buffalo, N. Y	Oct. 16, 1890	....	

APPRENTICE TRAINING SHIPS.

Jamestown. Commander B. P. LAMBERTON, U. S. N., commanding.			
Newport, R. I	....	Dec. 10, 1889	At Newport, R. I., last report.
Port of Spain, Trinidad	Jan. 6, 1890	Jan. 18, 1890	
St. Thomas, West Indies	Jan. 26, 1890	Feb. 1, 1890	
Port Royal, S. C	Feb. 16, 1890	Apr. 1, 1890	
Hampton Roads, Va	Apr. 8, 1890	Apr. 15, 1890	
Norfolk, Va	Apr. 16, 1890	May 13, 1890	
Hampton Roads, Va	May 13, 1890	May 19, 1890	
New York, N. Y	May 21, 1890	June 11, 1890	
Newport, R. I	June 16, 1890	June 25, 1890	
Plymouth, England	July 19, 1890	Aug. 9, 1890	
Funchal, Madeira	Aug. 21, 1890	Aug. 26, 1890	On summer cruise.
Hampton Roads, Va	Sept. 25, 1890	Oct. 2, 1890	
New York, N. Y	Oct. 6, 1890	....	

APPRENTICE TRAINING SHIPS—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Portsmouth. Commander JOHN SCHOULER, U. S. N., commanding.			
New York, N. Y		Jan. 4, 1890	At Newport last report.
Sandy Hook, N. Y	Jan. 4, 1890	Jan. 5, 1890	
Bridgetown, Barbadoes	Jan. 29, 1890	Feb. 12, 1890	Cruising in Gulf of Paria.
Port of Spain, Trinidad	Feb. 28, 1890	Mar. 10, 1890	
Do	Mar. 14, 1890	Mar. 19, 1890	
St. Thomas, West Indies	Apr. 3, 1890	Apr. 12, 1890	
Hampton Roads, Va	Apr. 25, 1890	May 6, 1890	
Norfolk, Va	May 6, 1890	May 28, 1890	
Hampton Roads, Va	May 28, 1890	June 2, 1890	
New York, N. Y	June 4, 1890	June 21, 1890	
Newport, R. I	June 26, 1890	July 9, 1890	
Plymouth, England	Aug. 1, 1890	Aug. 17, 1890	
Funchal, Madeira	Aug. 27, 1890	Sept. 1, 1890	On summer cruise.
New York, N. Y	Oct. 2, 1890		

A.

REPORT OF THE SUPERINTENDENT OF THE NAVAL ACADEMY.

U. S. NAVAL ACADEMY,
Annapolis, Md., October 1, 18

SIR: I have the honor to submit a report of the operations of Naval Academy during the past academic year.

The following table shows the numbers in the several classes at commencement of the academic year beginning October 1, 1890: Fi class, 48 members; second class, 53 members; third class, 62 bers; fourth class, 80 members.

At the annual examination in June, 1890, 34 naval cadets (31 of line and 3 of the engineer division) successfully completed the years' course at the Academy, received certificates of graduation, were detached for sea service.

At the same examination the following numbers of cadets failed to meet the required standard of proficiency: First class, 0; second c 10; third class, 10; fourth class, 5. Of these, 1 in second c 2 in fourth class resigned their appointments as naval cade the remainder were granted a re-examination in September. Of latter, 5 failed and 17 passed successfully the re-examination, and allowed to continue with their classes.

Four cadets of the fourth class were not examined in June, and have been continued at the Academy in the present fourth class.

The members of the class of 1888, except Naval Cadet Gates, successfully their final examination in June, and have since been c missioned as follows: Ensigns in the Navy, 18; assistant engineers in the Navy, 4; second lieutenants in the Marine Corps, 5.

Naval Cadet Gates was prevented by sickness from reporting with his class in June; he is now undergoing the required examination.

No material changes have been made in the course of studies, nor in the drills and exercises.

The beneficial effects of the new department of discipline, established by authority of the Navy Department in January, 1890, are already being felt. It only remains to perfect a system of reports, by means of which the cadets can be intelligently graded in this important branch, in order that the weight given it may have its proper effect in advancing in general standing those cadets who show marked aptitude for the naval profession.

The property for the purchase of which provision was made in the appropriation act approved March 2, 1889, has been condemned by a duly appointed commission, but, owing to flaws in some of the titles, the purchase has not been completed. Steps are being taken by the representatives of the Attorney-General's office to clear these titles, and it is believed that in a few weeks the property can be legally acquired.

An appropriation of three thousand five hundred dollars ($3,500) has been made for the purchase of property obstructing the opening of King George street, between the Academy grounds and College avenue. The price demanded by the owner for this piece of land is deemed to be in excess of its value, and it has been recommended that it be acquired by condemnation.

Plans and specifications have been made for the additional officers' quarters provided for in the act approved June 30, 1890. These houses will be completed and ready for occupancy before the beginning of the next academic year.

In this connection attention is invited to the estimates for six additional sets of quarters. The hardship to the junior officers who are not furnished with Government quarters has been so plainly set forth in the reports of my predecessors as to leave nothing to add in advocating this appropriation. It is believed that these additional quarters will be adequate to the wants of the Academy, but a less number will still leave unprovided for those officers who can least afford to bear the expense of renting. It is, therefore, urgently recommended that provision be made for all of them at the next session of Congress.

The question of quarters is one which materialy affects the effciency of the Academy, for the inadequacy of them is a serious impediment in the way of securing the services of the most desirable officers.

It has already been made manifest that, in the practical instruction of the engineer division of naval cadets, the facilities of the Academy are exhausted before the time allotted to it has transpired. It is, therefore, suggested that until the Naval Academy practice-ship shall be finished and ready for service, a small steam-vessel with modern machinery be provided for use in their training during about two and a half months of each summer.

In such a vessel these cadets will acquire experience in manipulating machinery, and their cruise can be so arranged as to enable them to visit public and private ship-yards, in which vessels of the latest type are being built.

From the report of the commanding officer of the practice-ship *Constellation*, which is appended, it appears that the practical instruction of the cadets in seamanship and navigation was as full as the limited time of the cruise admitted of.

It will be observed that the length of the cruise was only eighty-two days. This time is altogether too short. Recommendation will be submitted before the end of the academic year for prolonging the practice cruises.

I append herewith a statement of the appropriation for the support of the Academy for the fiscal year ending June 30, 1890.

Very respectfully,

R. L. PHYTHIAN,
Captain, U. S. Navy, Superintendent.

The CHIEF OF THE BUREAU OF NAVIGATION,
Navy Department, Washington, D. C.

U. S. S. CONSTELLATION, THIRD RATE,
Annapolis, Md., August 30, 1890.

SIR: I have the honor to submit the following report of the annual practice cruise in this vessel:

The cadets of the fisrt and third classes were embarked on June 9th, and the *Constellation* sailed on the forenoon of the 11th, returning to the anchorage off Annapolis for a few hours on the 14th, to receive several cadets of the third class the results of whose examinations had not been previously determined.

Sailing finally in the afternoon of the 14th of June, the number of cadets attached to the ship was as follows: First class, 46; third class, 62; fourth class, 1; total, 109.

During the cruise three first classmen were detached for duty in the engineer division of the Academy, two first classmen were granted sick leave, and one fourth classman granted leave until September 30th by your direction.

The ship passed Cape Henry at 9.30 a. m. on June 20th, and made the best of her way to New London, Conn., arriving at that port in the evening of the 26th, having made an anchorage the previous night in Napeague Bay, Long Island.

After a delay at New London, caused by the necessity of making repairs, the ship sailed on July 8th on her regular cruising duty in Long Island Sound, returning to that port the latter part of each week during July and a part of August for supplies and to give liberty on shore, except the week ending July 19th, when she sailed for Newport, R. I., arriving there on the evening of the 17th.

While at New London the ship was visited and inspected by the honorable Secretary of the Navy on July 6th.

While at Newport the cadets were given an opportunity of visiting the Torpedo Station, when the work in progress and the facilities of the establishment were fully explained to them by the officer in command and his assistants.

Sailing for Annapolis on the morning of August 18th, the ship passed Cape Henry at 8 p. m. on the 23d, and anchored for the night in Lynn Haven Roads. From that date the ship was under way whenever the weather or other circumstances permi working up to Annapolis, arriving 28th instant. The cadets were disembarked instant.

During the cruise the ship was under way every day when it was practicable exercise in making sail and getting under way, working ship, making and takin sail, reefing, and bringing the ship to anchor. The cadets of the first class were gi every possible opportunity to perform all the duties of seamen and petty offic junior officers of the watch, and officers of the deck. For this purpose a detail was made of the cadets of that class to stand watch, in four watches, as mate of b deck, mate of gun deck, midshipman of the quarter deck, officer of the forec officer of the deck. The detail commenced at 8 a. m. every Sunday and T shifting in turn, the officers of the deck returning to their stations as p crew of the ship and four cadets commencing as mates of berth deck. In each cadet, was, except in cases of sickness, on duty as an officer for seve eighteen days consecutively, and each cadet performed at least two complete t of each duty. The cadets detailed were, as far as possible, allowed to carry on all of the ship while in port and under way.

When not under way, except on Saturdays and Sundays, a daily lesson was a the cadets of the first class, which they were required to write up fully in journals.

All cadets on board were required to keep journals of the cruise, which were examined and marked by the watch officers, marks being assigned for accuracy and completeness. Cadets of the first class detailed as officers were assigned daily marks by all line officers on board for their attention and efficiency on duty.

The cadets of the first class were also given daily instruction in practical navigation, both in port and while under way.

On the 26th instant the examination in seamanship of the first class was held, and on the 25th that in navigation, the results of which are submitted in other communications.

The cadets of the third class received instruction in the duties of seamen, and were assigned weekly subjects in practical seamanship, on which they were examined and marked by the watch officers. Both classes were divided into five sections and the watch officers were detailed as instructors, the sections shifting each week.

The conduct and attention to duty of the cadets were generally excellent, and the progress made by them in seamanship and navigation is due to the interest generally manifested and to the interest and careful attention to their instruction displayed by all the officers of the ship.

It is to be regretted that the time of the practice cruise, from June 10th to August 29th, is so short. In my opinion the older custom of the Academy of continuing the practice cruise to the end of September would be in every way better for the morals of the cadets, and the last month would be, for the real acquisition of practical seamanship and knowledge of the routine and duties of a vessel of war, far more valuable than the previous time, as only at the end of the practice cruise, as at present limited, are all on board fairly settled down for effective work.

While the general results of the cruise have been, I think, very satisfactory, I have to report that some members of both classes embarked have shown little or no attention to duty or aptitude for the service.

The health of all hands has generally been excellent during the entire cruise. The much smaller percentage of cadets on the sick-list is, in the opinion of the medical officers of the ship, largely due to the greater comfort from not overcrowding the berth-deck with members of the fourth class entering in May. On this account, as also greater efficiency in the instruction to be given individual cadets on board, I would earnestly recommend that in future, as on the present cruise, only members of the first and third classes be sent to sea.

I submit a tabulated statement showing the number of days in port, number of days under way for instruction, and days at sea making passages between Annapolis and New London. While at sea the regular daily instruction was continued.

Very respectfully, your obedient servant,

HENRY GLASS,
Commander, U. S. Navy, Commanding.

Capt. R. L. PHYTHIAN,
Superintendent U. S. Naval Academy, Annapolis, Md.

Statement of cruising performed by the practice-ship *Constellation*, summer of 1890: Days at sea making passage—June, 6; August, 6. Days under way for exercise—June, 10; July, 14; August, 13; total, 49 days. Days at anchor—June, 6 (9th and 10th included); July, 17; August, 10; total, 33 days.

Length of cruise for cadets, 82 days.

Statement of the appropriations of the U. S. Naval Academy for the fiscal year ending June 30, 1890.

Headings of the appropriations.	Amount appropriated.	Expended to Sept. 30, 1890.	Unexpended balance.	Liabilities for articles ordered prior to June 30, 1890.	Balance in excess of liabilities.
Pay of professors and others	$52,119.00	$51,120.56	$998.44	$174.93	$823.51
Pay employés department steam-engineering	7,824.50	7,823.46	1.04	....	1.04
Pay watchmen and others	44,069.95	44,068.26	1.69	....	1.69
Heating and lighting, including transfers by order of superintendent	17,750.02	17,723.09	26.93	....	26.93
Contingent and miscellaneous expenses	40,300.00	39,764.68	535.32	485.22	50.10
Board of Visitors	1,500.00	1,161.12	338.88	....	338.88
Special course	5,000.00	2,138.41	2,861.59	2,800.00	61.59
Repairs	21,000.00	20,996.57	3.43	....	3.43
Furniture for cadet quarters	2,500.00	2,499.92	.08	....	.08
Total	192,063.47	187,296.07	4,767.40	3,460.15	1,307.25

In addition to the above $90,000 was appropriated for the purchase of land adjoining the Academy, and for inclosing and grading the same, none of which has been expended owing to the fact that condemnation proceedings have not been completed.

B.

REPORT OF THE HYDROGRAPHER TO THE BUREAU OF NAVIGATION.

SIR: I have the honor to submit the following report of this Office for the fiscal year ending June 30, 1890:

In assuming charge in November of last year I was gratified to find the Office in a thoroughly organized and efficient state, and I strongly indorse the action of my predecessor in the formation of a permanent staff, among whom are included graduates of the Naval Academy who did not receive commissions, but whose technical training and experience at sea is of great benefit to the office. By means of this organization the routine work is not hampered by the coming and going of the officers detailed for duty, and who formerly constituted the working force; the regular appearance of our publications is not interfered with, as might happen were it not for the existence of this permanent force, which has become thoroughly trained and familiar with the special duties required of them, rendering their services especially valuable to those temporarily in charge of the several divisions of the office.

It is to be regretted that the scale of pay in this Office is below that of similar work in other Government offices in this city, the result of which is that we are constantly liable to lose our most expert assistants by their being offered higher pay in the Geological or the Coast and Geodetic Survey. While benefiting other departments, it is injuri to the *morale* of this office.

Notwithstanding the difficulties encountered in lack of appropriations, cramped quarters, and meager printing facilities, the character and quality of the work is not excelled by any other nation, and the high standing of the Hydrographic Office is apparent from the tone of the commercial maritime papers of the country, numberless extracts of which I might give from the press of every sea-port city of the United States. The most flattering reviews appear in the foreign nautical and scientific publications as well, and our exchanges are filled with commendatory notices—such publications as the Nautical Magazine, the Shipping World, the Royal and Scottish Geographical Societies, Petermann's Mitteilungen, Annalen der Hydrographie, Revista General de Maritima, the Società Geografica Italiana, etc., constantly refer to the work of this Office. The Liverpool Journal of Commerce, in a lengthy review of this subject, says:

> It is a matter of congratulation that so necessary a department of the public service should be able to produce such excellent work, despite the fact that the space and the funds at their disposal are far from commensurate with the magnitude and importance of their manifold duties.

Such notices as the pamphlet of Professor Weyer, of the University of Kiel, Germany, on the subject of "The New American Great Circle-Sailing Charts," referred to later on, can not fail to be gratifying, and bear testimony, from distinguished sources, to the character of the work.

The insufficient quarters assigned to the use of the branch offices in the various sea-port cities cause complaint from year to year, and not without grave reason. A description of these cramped places would be amusing were it not a serious matter, and I can only indorse the reports of those who have preceded me and the earnest requests of the officers in charge for relief in this very essential particular.

The efficiency and popularity of the Pilot Chart regularly increases as its scope extends, and it has now become a necessity to the seafaring community and a standard authority all over the world. In a lengthy article in the Nautical Magazine for July it is repeatedly referred to and quoted from.

It is to be regretted that the appropriation does not admit of a larger edition, so as to meet the many requests we have for it outside of the regular issuing list.

The attention given by this Office in previous years to the subject of ice movements, and which is a very important part of the data of the Pilot Chart, has been very carefully considered, and the necessity of close attention is shown in the fact that unprecedently large quantities of field ice accumulated in the North Atlantic, extending as far south as the 40th parallel, causing considerable damage and delay to vessels that did not avoid it by taking the more southerly courses so constantly recommended.

It is hardly necessary to dwell upon the importance of this problem or the necessity of a thorough understanding of it, and, as the variations in the amount of bergs and field ice are very great from year to year, with a view to making more accurate predictions for each season an officer was directed to visit Halifax, St. John's, and other ports, to gather such data regarding the movement of ice during the present and past seasons, and the disasters and delays caused thereby, as would insure the reliability of these predictions, and his report shows that it is eminently practicable to get telegraphic reports from the coasts of Newfoundland and Labrador that will be of very great value

In this connection I may quote the following from the Boston Post

> A petition is now being circulated amongst masters of vessels navigating the Gulf of St. Lawrence and adjacent waters, the object being to petition the government of Canada to take such steps as they may deem advisable to obtain as thorough knowledge as possible of the currents in these waters, on account of their dangerous character in thick weather. This petition ends as follows:
>
> "We believe that the serious loss of life and property due to shipwrecks, attributable to "unknown currents" during fogs or hazy weather, may be thus greatly diminished. In such weather these currents are a cause of great anxiety and danger."

Such an investigation, if undertaken, must be of great benefit in connection with a knowledge of the probable movements of ice, and thus doubly advantageous.

A similar report on this subject, covering Bering Sea and the Arctic Basin, contributed by the U. S. S. *Thetis*, was very favorably received, and both these reports were placed on issue during the year and widely distributed.

A subject which has caused considerable trouble and vexation has been the difficulties existing in the way of a comprehensive and uniform system of spelling foreign geographic names. Especially is this true of any office or department engaged in chart or map making, publishing books of sailing directions, etc., and this Office, in common with others, has felt the need of some uniform system.

The hydrographic offices of Great Britain, France, and Germany have carefully considered this point, taking the initiative in their respective countries, and the British Admiralty, in 1885, produced a system, set forth in their sailing directions, which has been adopted by the Royal Geographical Society of London, and followed by the war and colonial offices and other departments of the Government. It was the greatest step in this direction, and, by comparing it with the French and German systems, we clearly see the tendency towards uniformity, each of the three making important concessions to the others.

The three principal chart-making nations of Europe have thus inaugurated a reform in establishing rules to be followed in their publications, and this Office, feeling the necessity of the adoption of a uniform system of spelling in its charts and sailing directions, by my order a Board has been for some months investigating the subject with a view to such modification of the Admiralty system as will render it appropriate for adoption, or, at its discretion, to report an original method, if necessary.

For some time we have been in communication with all foreign hydrographers, examining into their methods and much valuable information has been received, and it is hoped that the results arrived at will soon be ready for publication.

The interest felt in this subject by the various departments of the Government, as manifested in the formation of the "United States board on geographic names," organized to bring about consistency and uniformity by them in the spelling of geographic names within the jurisdiction of the United States, shows the importance of a subject wh difficulties and magnitude only became apparent when an attem made to give it the consideration it deserves. The necessity of such a step in this country has long been felt. In newly surveyed or set d portions, particularly in the Northwest, names have been duplica the orthography changed, and in many instances a totally different c substituted for the original; as, for instance, Mount Tacoma, in Oregon, changed from the old Mount Rainier, and numberless other instances. The old rule of not meddling with names already stamped upon places by the first discoverers has, by common consent, been held sacred, and such are the instructions issued by the British Admiralty to its surveyors. The tendency at present is in favor of the fixity of names, and to avoid confusion the law of priority should be held to be absolute.

The Dominion of Canada has given considerable attention to this matter also, and from a memorandum prepared by the executive committee of the Dominion land surveyors' association on geographic nomenclature it is stated that—

> In all cases where, after due inquiry, it is found necessary to apply new names, either owing to the non-existence of recognized names, or to inability to ascertain native names, they should be, whenever possible, of a descriptive character, or have some historical or other potent connection with the district; all trivial, meaningless, or too-common names being carefully avoided. And all names of places, in newly explored or surveyed districts to be approved before publication by the surveyor-general, the Director of the Geological Survey, or the head of any other department under which original geographical work may be carried out; it being understood that the head of such department assumes the responsibility of the nomenclature and of the orthography of names.

I have thus far briefly referred to several important points in preparing my report before taking up the several divisions separately and calling attention to their work. The subject of the branch offices, ocean surveys, derelicts, deep-sea soundings, the great circle sailing charts, terrestrial magnetism, the record of geographical positions, and the operations of the longitude and magnetic party are treated in turn, while the individual reports of the officers in charge of divisions and branch offices are appended, and to which I would invite your attention as showing, in detail, the nature and amount of the work done by each, often under discouraging circumstances in the way of force, space, and other requirements necessary to the production of perfect results. The amount of work done in the preparation of new charts, sailing directions, and their supplements, goes on increasing steadily, as is evidenced by the separate reports, and the improvement in the chart service has been productive of much satisfaction. The time required to fit out vessels is now reduced to a minimum, and, under the system of checks established, mistakes can hardly occur.

CHART CONSTRUCTION.

The facilities which were lately afforded to this division for concentrating its force have resulted in work of a higher grade, larger in amount than has ever before been realized. The expenditures of this division have also been largely reduced. The force of draughtsmen was diverted from work on charts for more than five weeks in October and November, 1889, to work out the results of the turning trials of the vessels of the squadron of evolution; but, notwithstanding this and the loss of force caused by the resignation of three engravers during the early part of the present calendar year, sixty-eight new charts have been engraved on copper and published. The general localities covered are the coasts of Canada, Lower California, Colombia, Ecuador, Peru, Chili, and the East India Archipelago.

The second of a series of special coast charts, resulting from the survey by the officers of the U. S. S. *Ranger*, on the coast of Lower California, has been published, and the third, covering the coast from Cerros Island to Ballenas Bay, has been drawn as far as San Bartolomé Bay, and awaits the results of last season's work for completion.

The report of the chief of this division shows in detail the work that has been done in the way of extensive corrections to chart plates, etc., while the utmost economy has been exercised in making old material on hand of service. The table giving the number of charts printed shows the annual increase still continues. The plan of electrotyping to produce altos, which enables the costly and original engraved plates to be preserved indefinitely, is an excellent one.

The method of recording deep-sea soundings has been modified with a view to supplying promptly all the recorded information relating to any portion of the ocean. Fifteen sheets containing all the reliable soundings observed in the North Pacific Ocean have been finished, and fifteen additional ones are ready to receive the data for the South Pacific. Important statements as to where deep-sea soundings could be most profitably carried on are made in the appended divisional report.

An alphabetical list giving the geographic positions of places in South America and the secondary meridians upon which the longitudes depend has been prepared for publication as the first of a series of extracts from the record of geographic positions. The observations recently made for magnetic declination, dip, and intensity, by Lieutenants Norris and Laird, and Ensigns Holcombe, L. M. Garrett, Wilson, and Wood, have been computed and prepared for publication. They furnish valuable results at Vera Cruz, Coatzacoalcos, Salina Cruz, Puerto Plata, Curaçoa, and La Guayra. Tables showing the magnetic variation and rate for any year have been deduced for places in South America, and in China and the East, in addition to those referred to in the last annual report.

An important change in the method of dealing with information received has been inaugurated. The information is charged to the geographic locality to which it refers, as well as to the charts which it affects; and, thus, when a chart is to be corrected, all information affecting it is readily investigated, and when the work extends into a new locality, all available information referring to it is speedily collected for discussion. Changes in the methods of treating different portions of the work on charts have also been brought about with a view accomplishing greater uniformity and economy in chart making.

In order to print charts from so large a number of plates as the office now possesses, in accordance with the demands of ships of war and the sales agents, a power-plate printing press should be installed. Approved designs of these presses are offered in the market. The cost is $1,500. A power-lithographic printing press is also needed; this will cost $4,000.

CHART SUPPLY.

This division has charge of all charts kept on hand for sale or issue. It is divided into two sections. In the Hydrographic Office section are kept on hand charts published by this Office, and also three copies of the Coast Survey charts for the supply or fitting out of vessels in cases of emergency. These charts are kept corrected to date, and the increasing number of charts published by this Office has entailed a large increase in the work of the section. The force remains the same as in former years but is no longer adequate to the work, and an addition to the force of the Office of one draughtsman to supply the deficiency of this section is recommended.

The receipts for charts for the fiscal year ending June 30 exceeds by 25 per cent. the receipts for any previous year, showing that the demand for charts published by the Office is constantly increasing. The appointment of a number of additional sales agents near the end of the year will, it is believed, largely increase the sales in the future, though owing to the short time that has elapsed since the issue of the appointments, their effect has hardly, as yet, been felt.

The number of ships annually commissioning is greater than it has hitherto been, and the number of foreign charts and books necessary to be purchased is, therefore, increased. The appropriation hitherto available for such purchase has been about $4,000, but in the ensuing year this will probably be greatly exceeded. It is especially unfortunate as no direct appropriation was made for this purpose for the current year. The result will be that the Office will be seriously crippled for lack of funds. I would recommend for the ensuing fiscal year an appropriation of $5,000. This is an increase of but $1,000, and will be in proportion to the anticipated increase in the number of charts required.

The Office now publishes a complete set of charts of the American continent (except the United States, charts of which are made by the Coast Survey, and excepting also plans of a few ports and localities) and they are in some respects superior to those of any other chart publishing nation. In this connection, I wish to call your attention to certain important localities of which the present surveys are very defective or almost wholly worthless, seriously affecting the value of a considerable number of charts.

Under the head of "Ocean Surveys" I have referred at length to the most important of these places, but attention is also called to the following localities:

PORTS ON THE WEST COAST OF SOUTH AMERICA.

Many of these ports have been insufficiently surveyed or else have changed greatly since the latest surveys.

The west coast of Chili between the straits of Magellan and Valparaiso. This portion of the coast needs considerable examination and sounding work. The present charts are made up by a sort of patch-work from surveys of widely different dates, few of them recent, and there are many discrepancies and unsurveyed parts. The new series of charts of the west coast of South America has not been carried below Valparaiso, owing to this lack of reliable data.

The lesser ports and anchorages of the west coast of South America. Nearly all the smaller ports on the west coast are insufficiently surveyed, and many of them are charted in a most sketchy manner, owing to lack of data. Very little work—a few hours in many cases—would add greatly to the value of the existing plans.

The charts of the Pacific Ocean are covered with "reported" shoals, reefs, and dangers, marked "doubtful" or "position doubtful." Many of them, doubtless, do not exist, and many more are really in existence but not correctly located. The neighborhood of the Hawaiian Islands is full of these reported dangers. Only a careful search can prove or disprove their existence, and, until the search is made, mariners must either be much worried by the uncertainty attending navigation in these regions or else avoid the localities entirely by wide detours at a considerable loss of time and much additional expense.

The British admiralty section of the division of chart supply has charge of the issue of charts to vessels of the Navy. There is kept on hand in this section a small supply (five to seven copies each) of all British admiralty charts of regions not covered by this office or the Coast Survey. The accounts of charts issued to vessels are kept with great care. Each vessel is treated separately and the dates of all charts on board are recorded and compared with all new issues. New copies of charts are furnished vessels when any important corrections are made which are not mentioned or which are not sufficiently described in notices to mariners. A large saving, amounting to over 25 per cent. of the total number of charts issued, has been effected by the system of holding back new editions of charts of localities distant from the vessels' ordinary spheres of action until the time approaches when they are liable to be in the locality of the held-back charts. Many charts pass through several editions in the course of a year, while the vessel would need them but twice in her cruise, going to and returning from her station. The expense of furnishing the editions published during the interval is thus saved.

The new catalogue of charts, plans, and sailing directions prepared in this division, and which was greatly needed, was placed on issue during the year and is very complete in all its details. If the necessary type for this publication could be purchased it could be kept set up and corrected as required, thus enabling the regular issue to appear annually. As a matter of economy it is earnestly recommended.

SAILING DIRECTIONS.

During the year nine new publications were placed on issue, exclusive of the new editions of the American Practical Navigator and the Useful Tables.

Continuing the plan outlined, sailing directions for the east and west coasts of South America were published, which canceled the old Hydrographic Office books Nos. 43 and 59, and did away with the necessity of the further purchase of the British Admiralty South America Pilot, Parts I and II. I regret that an insufficient appropriation prevented the publishing of two other books which had been prepared, and which would have completed the Western Hemisphere, viz: Nova Scotia, Bay of Fundy, and Gulf and River of St. Lawrence; Vancouver Island and British Columbia.

It is the aim of the office to be independent of foreign sources of supply, and, until this is realized, we must purchase from abroad. It is the more to be regretted when time and labor have already been taken up in the preparation of these manuscripts, because the publications of Hydrographic Office are, in many respects, unlike those of other government offices. The value of the information they contain depe upon prompt publication and distribution, and the details of this information are constantly changing. When such a book or pamphlet goes through the regular routine of Government printing, months sometimes elapse before it is received in this office, even when it is made "special." The number of corrections, in the mean time, is constantly growing and frequently necessitates a further delay in issue of some weeks to admit of these corrections being entered by hand. These delays nullify work, to a certain extent, and prevent the attainment of the result aimed at, viz, to give prompt and reliable information of all changes wh mariners should know.

In the case of the Light Lists, the constantly changing character of the publications renders electrotyping impracticable. There rema but the one alternative, which is the purchase of material sufficient to set up an entire volume, and keep it set up and corrected ready for print at all times. This would seem at first glance to be an expensive proceeding, but it is very economical in the long run. The initial expense is considerable, but after being once made up the work of c position is finished for all subsequent editions, except as regards the corrections, which could be made from time to time at little or no c The annual bills for publishing a light list, for example, would then be about $75, instead of $1,600, as at present. It needs no further argument to show that, unless the initial expense is enormous, the saving must be very great. But the initial cost for the book mentioned is only about $1,600, and the cost of the original composition would be largely offset by the saving in the publication of supplements, which are necessary under the present system. A portion of the cost of material could be saved by electrotyping the running heads of pages, titles, etc.

A second edition of the Caribbean Sea and Gulf of Mexico, Vol. II, was rendered necessary by the exhaustion of the old one, and was prepared accordingly on the same lines as Vol. I, on the new system that has met with such favorable criticism. In referring to the recently published West Coast of South America, the Nautical Magazine (British) says:

> This work is No. 89 of the United States Hydrographic Office, and a suitable companion to No. 88, East Coast of South America. It has been compiled on the same careful basis and the accuracy of all the various authorities tested. The archives of the Office, as well as every foreign source, have been ransacked for information. * * * As a book of sailing directions it is excellent, and contains all the information that a shipmaster requires, whether for navigation or the transaction of commercial business.

The International Code of Signals, edition of 1890, received last March, has been exhausted. Prepared with especial reference to the needs of the American navigator, the edition was soon bought up and should be republished.

For a complete list of works issued, canceled, or in preparation your attention is called to the detailed report of the chief of this division, which shows as well the British Admiralty publications necessary to be purchased for our own vessels, and which, it is hoped, will in time no longer be a necessity.

The value of the increased printing facilities over those of previous

years is shown in the number of supplements to Sailing Directions prepared and issued during the year. Twelve have been printed, and these, with those in preparation, save a great expenditure in time and labor in correcting the books, while they serve to bring the latter up to date until new editions can be issued.

Twenty-three ships were fitted out with complete or special outfits of books, as required, and, as with the chart service, the same careful system of checking prevents the possibility of mistakes.

While I have reduced somewhat the number of extracts of notices to be distributed, this does not indicate a falling off in this very important subject; on the contrary, the number of announcements (from new sources of information) has been increased one hundred and seventeen over the previous year. The steady gain in this matter, as shown from year to year, indicates the increased interest felt in the work of the Office, and, in this connection, the assistance of the courteous chief of the Consular Bureau in directing the attention of the consuls to the importance of furnishing information obtainable by them has been very valuable.

Our vessels in commission have been equally attentive, and I trust this interest will not slacken.

On the importance of issuing our publications to United States vessels, I think there can be but one opinion. The work of revision and compilation goes steadily on, and it is hoped that this material, prepared at the cost of expert labor, will not be suffered to become valueless through lack of sufficient means to publish them.

MARINE METEOROLOGY.

The report of the chief of this division illustrates the great increase in the amount of routine work, due to the rapidly increasing number of voluntary observers on board vessels of the mercantile marine. I beg to call especial attention to the growth of this portion of the work of this office, inasmuch as it positively demands a large increase of space and working force. It is impossible to speak too highly of the admirable support that masters of vessels give us in this work; the hundreds of reports that come in weekly, sometimes as many as seventy in a single day, are filled with accurate and carefully recorded observations taken at specific times each day, according to the directions accompanying the forms. All of these testify to the gratifying appreciation that our methods of work and style of publication meet with at the hands of our voluntary observers. The accompanying plan from the Pilot Chart for June, 1890, illustrates very clearly the large number of vessels from which we receive reports (the names, nationality, rig, and positions of ninety-seven vessels are stated and the data from their reports utilized on this single chart). The very great practical importance of such work, as showing in a graphic and convincing way the true character of ocean storms, upon a knowledge of which the safety of a vessel and all on board must often depend, is self-evident, as is also the necessity of suitable facilities in the way of space and force to handle such data in a way to make the results of immediate practical value to officers of the Navy and mercantile marine.

This chart, it should be noted, represents but a singe day of a single storm. To illustrate the progress of this great hurricane, in which more than forty-five vessels were wrecked (twelve of them lost at sea), similar daily charts should be prepared for eight days. Such a set of charts with accompanying text, if prepared with the same care and accuracy

as this one, would be of very great practical importance, and sin
work should be done for other storms in order to deduce and enf
correct rules for action in hurricanes—rules based on a firm founda
of observed fact, and stated in such a way and with such weigl
evidence as to command attention from masters of vessels and t
accepted as authority in examinations for officers' licenses and in c
before admiralty courts. In this connection I may state that
Everett Hayden, marine meteorologist of this office, was called u
to testify regarding the loss of the steam-ship *Samana*, which ve
sailed from New York November 22, 1888, and has never been h
from since. His testimony was accepted by judge and jury as con
ive that the vessel was lost in this particular storm, on the 24th or
of November, and it is gratifying to know that this office is ca
upon very often for such expert testimony, which it should alway
prepared to supply in any question relating to hydrography and
rine meteorology.

I desire to take advantage of this opportunity to acknowledge
indebtedness to the State Department for very valuable assistanc
the way of forwarding reports handed in by masters of vessels at v
ous consulates, without which assistance the transmission of suc
ports would often be very seriously delayed. The chief of the
sular Bureau, Dr. F. O. St. Clair, has taken every opportunity to fa
tate our work, and with his kind co-operation the following circ
was prepared and submitted to the honorable Assistant Secretar
State, Mr. William F. Wharton, who approved and forwarded it t
our principal consuls and consular agents:

DEPARTMENT OF STATE,
Washington, March 1, 1

To the consular officers of the United States:

GENTLEMEN: The attention of this Department has been called to the fact
occasional delays have occurred in the transmittal to the Hydrographic Office,
Department, of reports of marine meteorology and other data from masters of ve
owing, it is thought, to a misapprehension of paragraph 350 of the Consular Re
tions. The circular from this Department, dated December 6, 1888, relative t
discontinuance of the transmission of meteorologic reports to the Chief Signal O
United States Army, expressly stated that it was not intended to modify the p
ions of this paragraph. On the contrary, additional care should be taken t
ward such data promptly, inasmuch as the Hydrographic Office is now colle
marine data, both for its own hydrographic and meteorologic work and for the
nal Office as well, and both offices are now dependent to a very large extent
your cordial and intelligent assistance in this matter.

It is, therefore, requested that you will please refer to paragraph 350 of the C
lar Regulations, and note particularly the various subjects upon which inform
is desired by the Hydrographic Office, and that you will note carefully the follo
additional details regarding subjects of especial importance in the marine me
ologic work of that office, a field of research in which the United States at one
under the distinguished hydrographer, Lieut. M. F. Maury, U. S. Navy, took the
of every nation and rendered the most invaluable assistance to commerce.

There are inclosed herewith sample copies of the principal blank forms distri
to masters of vessels upon which to record their observations (Form 105, Incl
A) and a sheet of six "ocean current reports," or "bottle papers" (Inclosur
intended to be sealed in empty bottles and thrown overboard in order that
picked up and returned information may be obtained regarding the general dri
set of the great ocean currents. You are, of course, familiar with the principal
lications of the Hydrographic Office, such as the monthly Pilot Chart of the N
Atlantic Ocean, the weekly Notices to Mariners, and the Sailing Directions for va
coasts and oceans, and you will readily understand that the prompt receipt and
ization of reports must add very greatly to the value of these important publicat

The hydrographer has at various times made especial mention to this Depart
of valuable assistance rendered to him by certain consular officers, and it is h
that you will devote your earnest attention to this matter and assist him in e
way in your power. The widely acknowledged success of the Pilot Chart of

North Atlantic Ocean has induced the hope and expectation that similar charts will be published for other oceans, and it is very possible that you can render very important aid in the collection of data that will be of material assistance in such an undertaking. In order to illustrate to some slight degree the general character of information published on the Pilot Chart, in addition to the still more complete graphic data, there is also forwarded herewith (Inclosure C) a reprint of articles that have appeared upon the Pilot Chart of the North Atlantic Ocean from time to time, and you have doubtless noticed how widely these and other articles are quoted in the leading shipping and hydrographic journals at home and abroad. In this connection it may well be stated that articles in local or other newspapers and journals, if relating in any way to navigation or commerce, are of great interest and value often containing important information not likely to reach the office in any way other than by means of clippings forwarded by you. Indeed, it is of interest to see any published quotations from or reference to Hydrographic Office publications as indicative of subjects upon which information is most welcome, and at times as suggesting desirable corrections or additions to the chart or book referred to.

It is desired, also, to revise the present Sailing Directions from time to time in order to keep up with such changes as take place continually in the various dangers and aids to navigation, as well as to make available to navigators the latest knowledge regarding the best sailing and steam routes, the weather and climate of various coasts and oceans, and all matters of interest to commerce. In the matter of weather and climate, particularly, you can doubtless render valuable aid to the Hydrographic Office, and regarding weather signals and storm warnings actually in use at the present time and hoisted as a guide or warning to vessels. Such assistance on your part will always be highly appreciated and fully acknowledged.

From your official position and relations with the local authorities it is possible that you can readily obtain access to valuable original data and late unpublished news regarding the present status of affairs by consulting with those who have made a special study of these matters, as they will in most cases willingly communicate their views and give you the benefit of their experience. You are doubtless aware of the establishment in our principal sea-ports of branch hydrographic offices, where information is furnished to navigators of every nationality free of charge. The addresses of these branch offices are given on one of the forms forwarded herewith (Inclosure A). You might well call the attention of the local authorities to this fact, and cause it to be posted or published conspicuously for the benefit of navigators trading with our ports.

This subject has been referred to at some length in this circular in order to emphasize the interest with which this Department regards the work of the Hydrographic Office; and it is requested that you will give due consideration to the matter and reply at some length, stating your views relative to the attention you can pay to the work consistently with a proper observance of the other duties devolving upon you, and inclosing such data as may be at hand or available and likely to be of immediate value in preparing Pilot Charts for various oceans, revising Sailing Directions, and in other current work of the Hydrographic Office. It is desired to refer your replies to the hydrographer for his consideration in order that he may be better able to judge as to the publications likely to be of greatest interest to you and the kind of information that you can give him in return. By means of such co-operation it is thought that the work of the Hydrographic Office and the interests of commerce will be materially assisted.

I am, gentlemen, your obedient servant,

WILLIAM F. WHARTON,
Assistant Secretary.

With such cordial co-operation on the part of our Consular Bureau, with the facilities for the collection of marine data offered by our branch hydrographic offices, and with the willing assistance of hundreds of observers on vessels of the Navy and mercantile marine in every ocean of the globe, it only remains to increase the office force to the number absolutely necessary to handle and utilize the very complete data that we receive, in order to publish results of the greatest value to commerce. Under present conditions we can only sustain the high standard of the Pilot Chart of the North Atlantic by constant and unremitting exertions without attempting to utilize data from the other oceans, or even revising the data in our Sailing Directions regarding the climate, weather, and storms of the various regions covered by them—work for which this division is responsible, and which every consideration of propriety and self respect requires us to do, than copy blindly from the publications of some foreign office.

As stated above, and as indicated in the report of the chief of division, the Pilot Chart has engrossed a large part of the time of division, although the acknowledgment of reports from vessels in o oceans, and the attending to requests for information on spec subjects constantly coming in from these and other sources, have like required much care and time on the part of all the available force. ports from the branch offices, frequent quotations and comments i the leading commercial papers, at home and abroad, and informa from official and private letters, all of these unite in hearty approva the Pilot Chart and Weekly Bulletin, and probably nothing has ever done more to increase the reputation and influence of this office the continued success of these publications. The commendation Pilot Chart is constantly receiving from foreign sources is particu gratifying, and nautical and other scientific publications are consta referring to it. The July number of the Nautical Magazine—a s publication of scientific information to the English and merchan rine of the world—in an article on "Ice in the North Atlantic," says:

> Those excellent publications, the Pilot Charts of the United States Hydrographic Office, are now our great authority on the distribution, month by month, of ic the Atlantic.

and again in the same article—

> Reverting again to that invaluable document, the United States "Pilot Chart," etc.

It has been frequently urged that similar work be initiated in other oceans, notably the North Pacific and South Atlantic, but without a specific appropriation for the purpose, nothing can be done in direction, important as all must recognize it to be. A project that may be of great importance in leading to a Pilot Chart for the South Atlantic and the west coast of South America, a region where there every indication of a large increase of American commerce, is referred to and strongly commended by the chief of the division in his report. By this I mean the proposed daily weather charts of the North and South Atlantic, from October to May, inclusive, the time of the cr of the U. S. steamer *Pensacola* to the west coast of Africa, with United States Eclipse Expedition. The following article quoted fr the Pilot Chart for June, explains this project fully:

[From the Pilot Chart of the North Atlantic Ocean, June, 1890.]

THE METEOROLOGY OF THE NORTH AND SOUTH ATLANTIC.

In connection with the report of the United States Eclipse Expedition to West Africa, under the direction of Prof. D. T. Todd, a work of very great importance to navigators is to be undertaken, namely, the preparation of a set of daily weather maps of both oceans from October to May, inclusive, the entire period of the cruise of the U. S. S. *Pensacola*. This office recognizes and desires to call attention to the importance of this subject and the exceptional opportunity that is presented for utilizing very completely and thus making available to commerce the data already at hand, together with such additional data as may be contributed for this purpose by various Government offices and individual navigators.

The scheme determined upon consists in the preparation of a weather map for each day at noon, Greenwich mean time, from October 1, 1889, to May 31, 1890, inclusive, for the entire area between lat. 70° N. and 60° S., long. 20° E. and 100° W. In addition to the Greenwich noon observations that are kept regularly for this office by nearly two thousand voluntary observers, it is earnestly desired that other navigators of these waters, within the limits of time and place mentioned above, forward such data from their log-books as may be useful in this connection, selecting those observations that come nearest to noon, Greenwich mean time, and stating as many details as possible regarding wind, weather, state of the sea, and velocity and set of currents. In the case of a storm hourly observations about the time of the lowest barometer will be very useful, and any detailed observations, other than those referred to, will be highly appreciated. If a reliable mercurial barometer were used the record will be all the more valuable, and in any case the character of the barometer should be stated, with a note relative to the time and place of last comparison with a standard, and the readings of the standard and ship's barometer when such comparison was made. Data from land stations are also very important, especially such as are not accessible in any published records.

Prof. Cleveland Abbe, the meteorologist of the expedition, acknowledges the uniform courtesy and valuable assistance that he has received at the hands of the officers of the *Pensacola* and the authorities at all the ports visited by that vessel. To make this great undertaking a success, however, there must be further and cordial co-operation amongst the nations interested in the meteorology of this vast area and amongst navigators of every nationality. It has long been the desire of this office to commence the publication of a pilot chart of the South Atlantic and West coast of South America, and the present undertaking will furnish an admirable basis for this work. The Pilot Chart of the North Atlantic Ocean has won a place for itself in the esteem of navigators generally, without regard to nationality, and it is intended to publish the result of the present investigation in such form and with such wide distribution as well to repay every one who contributes to its success.

If in any case it be impracticable to copy and forward extracts from original and important data, this office will gladly make an effort to provide for such work, upon notification that the data are available. Reports handed to any United States consul, or to the commanding officer of any United States naval vessel, will be transmitted free of all expense to the observer, and in each case due credit will be given in the published report.

If this plan be carried out and brought to completion, the result must be of infinite value to our commerce with the South American Republics, both on the Atlantic and Pacific coasts. But to do this will require the most thorough and painstaking work for a year or more, and the organization and assistants adapted for this work will be admirably adapted for the publication of a regular monthly pilot chart, upon the plan now in such successful operation for the North Atlantic. I have the honor to recommend this subject to your most careful consideration as having my most hearty approval and support. If a specific sum, say $5,000, were available for this purpose, there can be no doubt but that we can make it a success in every sense of the word. The inter-relation between the work of this division and that of the United States Signal Office is a question that derives especial interest from the fact of the proposed reorganization of that office as a bureau in the Department of Agriculture, the transfer to take place at the beginning of the next fiscal year (July 1, 1891). As stated in the last annual report of my predecessor, the cellection of all marine data is now carried on by this office, the reports thus collected being referred to the Chief Signal Officer of the Army for the use of his office in preparing the monthly review of the North Atlantic storms. Many data are received for which he has no use, such as journals, logs, etc., not containing so-called "simultaneous data" (which are recorded in special forms).

For the proper study of any ocean storm all available information should undoubtedly be utilized, for even then there must always be wide regions where no data are available on account of the absence of vessels. The Pilot Chart also publishes a monthly review of North Atlantic storms as indicated by data received up to date of publication (about the last day of the month). Thus the proposed organization of the Weather Bureau brings up various questions as to the plan of co-operation to be adopted between this office and the new bureau, and I beg to call your attention to the importance of this subject, both to the Navy and to commerce generally. With our branch offices, our large corps of voluntary observers, the necessarily intimate connection between our Navy and commerce, the essential importance of a nav officer of a practically thorough training in the subject of ocean [illegible]rms and the present status of the Pilot Chart as regards this very [illegible] in view of all these considerations I beg to suggest the propriety importance of a recognized and intimate connection between our ow work and the work of the new bureau upon somewhat the same b as now obtains with the Coast and Geodetic Survey. The followin quotation from the Hydrographer's last annual report is of interest i this connection:

> The larger matters of storm warnings in the Bay of North America, more partic larly with reference to West Indian hurricanes and storm signals on the coasts, ca only be developed through the aid of the Signal Service of the Army. The Navy ha a vital interest in this, and must get its information mainly through the Hydr graphic Office. The Chief Signal Officer has always been most willing to give assis ance, and has expressed himself as desiring to meet as far as possible the wishes o the Hydrographic Office, as indicating the necessities of the Navy and merchant ma rine in this respect. The best results in this connection are expected from the establishment of a marine observatory at Havana, under the direction of Captain Carbo nell, of the Spanish Navy, working in co-operation with Rev. Father Viñes, of Bele College Observatory. There is now an organized system, extending through th West Indies, for the transmission of reports during the hurricane season throug the Havana office to the Signal Office. This has been brought about by the Signal Office, assisted in a great measure by the efforts of the Hydrographic Office, in correspondence with various observers in the West Indies, and by the visit of Mr. Everet Hayden, marine meteorologist, to Cuba during the hurricane months of last year. This promising field should be occupied by the Navy. The Department should establish stations throughout the West Indies, and in co-operation with the Signal Servic bring the subject of West Indian hurricane warnings to a greater degree of perfection.

In this new bureau there must be a large field for the improvem of storm-warnings for the benefit of commerce, and incidentally of naval vessels along the coast and in the West Indies. Duty in such a bureau must be of the greatest advantage to naval officers, for it i work directly in line with their profession. The enormous importa of transatlantic steam communication now renders it essential that a well-considered scheme of weather predictions and storm warnings shall be devised and carried into practical execution for the express ben of transatlantic steamers. Telegraphic and other facilities now [illegible]ailable make it perfectly practicable to publish forecasts of weather likely to be encountered by outward-bound vessels as far east as the fifti meridian, the wind, weather, fog, etc., likely to be met with for fi two to five days after leaving port.

BRANCH OFFICES.

I desire particularly to call your attention to the good work doing by the branch offices and their growing popularity. Not only is their establishment a benefit to the maritime community at large, but it benefits the Navy in another way—that is, it is brought into cordial relations with the maritime community, which is made to feel that there is an interest in common between them, the importance of which, in time past, has not been properly considered.

I would therefore suggest that it be the policy of the department to aid and encourage these offices in their useful and beneficial work.

Branch offices are established in the Custom-house, Boston; Maritime Exchange, New York; Maritime Exchange, Philadelphia; Custom-house, Baltimore; Custom-house, Norfork; Custom-house, Savannah; Maritime Association, New Oleans; Merchants' Exchange, San Francisco; Merchants' Exchange, Portland, Oregon.

For the support of these offices the appropriation last year was but $12,000 to cover all expenses, salaries, stationery, office expenses, rental, when required, and collection of news, which amount is inadequate for the proper running of the offices.

In the appropriation bill this year two offices were added, Chicago and Portland, Me., with a total appropriation of $18,000, but at the last moment, while the section establishing branch offices at Chicago and Portland, Me., was allowed to remain, the increase of appropriation *was stricken out* and only the amount of last year allowed, which, as I have stated before, was inadeqnate for the proper maintenance of the offices already established.

Reports were received for the first time from two new branch offices this year, Portland, Oregon, and Savannah, Ga., and the beneficial results accomplished by them show the wisdom of their establishment. The sale of our nautical publications was increased in consequence, and a gratifying preference noted for them over those of foreign nations. Without going into details, your attention is called to the individual reports of the officers in charge of the branch offices for complete statements of the work accomplished by each.

In conclusion I have to express my appreciation of the assistance rendered me by the officers in charge of the several divisions, who have endeavored, in every way possible, with the limited force at their disposal, to obtain the best results. The officers in charge of the branch offices, with their assistants as well, have ably seconded me in carrying out the purpose for which they were established, although their facilities have been of the most limited kind.

I regret that the exigencies of the service required the detachment of such excellent representatives in our seaport cities as Lieuts. John Downes and W. P. Conway from this duty, while the main office loses by the detachment of Lieut. D. W. Coffman, who was in charge of the chart supplies. To the light-house inspectors and the Signal Service observers who have aided us, this office is greatly indebted, and returns its sincere thanks; while to the various branches of the Government, the Department of State, the United States Coast and Geodetic Survey, and the Light House Board especially, we are under many obligations. In addition I wish also to refer to the courtesy and coöperation of the various maritime exchanges, who have been of the greatest assistance to us in all possible ways.

Summary of reports of branch offices.

	Boston.	New York.	Philadelphia.	Baltimore.	Norfolk.	New Orleans.	San Francisco.	Portland.	Savannah.	Total.
Trade-wind report	677	701	106	2	7	3	232	78	85	1,891
Ice report	176	594	748	32	6	5	1	1	12	1,575
Fog report	253	787	182	35	6	13	1	6	29	1,312
Water-spout report	9	25	......	......	......	1	5	1	12	53
Earthquake report	......	......	......	......	......	......	3	......	......	3
Current report	7	55	207	2	2	1	15	6	15	310
Vessels visited	2,781	7,038	1,861	1,491	244	392	711	278	616	15,415
Chronometers rated	......	......	......	......	......	31	46	......	......	77
Barometers compared	3,194	2,106	1,695	520	43	527	171	18	296	8,570
Information given to individuals	21,126	75,435	24,845	......	4,225	878	7,357	1,845	1,175	136,886
Charts corrected	21	67	6	15	315	......	61	2,899	4	3,388
Notices to mariners circulated	217,214	232,440	395,907	57,557	34,617	72,921	27,662	13,695	18,985	1,070,998
Pilot charts circulated	4,397	11,012	3,074	1,672	1,651	814	193	94	254	23,191

OCEAN SURVEYS.

The work on ocean surveys this year has not been satisfactory.

From time to time, as it seemed possible to engage the services of naval vessels for temporary surveying operations, plans and instructions were prepared for surveying on the Spanish Main, the south coast of Cuba, at the mouth of the Orinoco River, and in the track of commerce between San Francisco and the Hawaiian Islands and the westward.

In these localities and in many others the state of our commerce demands trustworthy charts, but the information on hand is unfit to make them. In all these cases, after vessels had been detailed the plans had to be laid aside, as it was found that the exigencies of the service required these vessels for other missions, and among them the *Thetis* and *Ranger*, looked upon as surveying vessels. From the experience of the past year and of previous years, it is clear that naval vess regularly commissioned for service, can not be spared from the larger demands of the general service long enough to render effective assistance in carrying on this work. Therefore, I recommend, as my predecessors have done, that specially constructed, or the smaller, vessels of the Navy be equipped for this service and permanently assigned to it. Such vessels ought also to be fitted for the destruction of derelicts.

THE SPANISH MAIN.

The charts of the north coast of South America from the Orinoco River to Aspinwall are chiefly from the results of a cursory survey the Spaniards in 1816 and 1817. This is the nearest approach to a systematic examination that has ever been made on the Spanish M All subsequent work has been confined to the examination of spe localities or devoted to the determination of geographic positions o places widely separated. It has long been known that many points o this survey are considerably in error, and, with a view of improving charts of the Spanish Main, the U. S. S. *Huron*, Commander G. P. R U. S. Navy, commanding, was sent in 1877 to determine the latitudes longitudes of a number of points between Port Spain, Trinidad, and Aspinwall, Colombia, the longitudes of which had been determined by the exchange of telegraphic time signals. At Unare Bay Commander Ryan's work disclosed an error of 7½ minutes in longitude; at Puerto Santo 1½ minutes in longitude; at Pampatar, an agreement; at Cumana, minutes in longitude; at Corsarios Bay, 4½ minutes in longitude and minutes in latitude; at La Guayra, 3½ minutes in longitude; at Bahia Honda, 4½ minutes in longitude and 2½ in latitude; and at Carthagena 8 minutes in longitude.

Some years before the date of Commander Ryan's work, the British adjusted the coast line, as determined by the Spanish surveyers, to fi between pairs of geographic positions which had been determined b them, and the coast line was thus contracted in some parts and expanded in others. The positions to which the survey was thus adjusted were irregularly in error as compared with those determined with reference to telegraphic meridians by Commander Ryan in 1877. T differences are 5 minutes in longitude at Puerto Santo, 6 minu ongitude at Pampatar, 4 minutes in latitude and 6 in longitude a Testigo Grande. 2 minutes in latitude and 8 in longitude at Cor ri Bay, and so on. Since 1877 French and German navigators have mined latitudes and longitudes of several points the positions of which were also determined by Commander Ryan, and their results show fair agreement with his. In 1888 the officers of the U. S. S. *Yantic*, Commander Heyerman, U. S. Navy, determined the positions of some of Commander Ryan's observation places, and their results are also in agreement.

In 1886 a chart of the coasts of Columbia and Venezuela, from the Gulf of Darien to Puerto Cabello, was compiled from the early survey combined with the work of the officers of the U. S. S. *Huron* and other accumulated information. The defective condition of the data made it impossible to construct a creditable chart, and the attempt to extend the work to the eastward was therefore abandoned.

Even if the entire coast line could be correctly delineated from the new determinations, the charts would still be in want of a proper representation of the hydrography which is undeveloped. There are also numerous islands, rocks, and shoals along and off the coast which require thorough examination and exact location. The existing charts consist of alternate sections in which the hydrography is unknown, or represented in general as it was found to be seventy years ago, and, on the whole, may be said to be untrustworthy.

THE MOUTH OF THE ORINOCO.

South of Trinidad, at the mouth of the Orinoco and the vicinity, a similar unsatisfactory state of affairs exists. For several years reports have been received by the Hydrographic Office bearing uniform testimony that the charts are grossly in error, and that great changes have taken place in the banks and soundings at the mouth of the river, but such reports do not provide data for the construction of a correct chart.

The growing importance of the trade of the United States in this locality, and the consequent demand for a good chart, warrants a special survey at an early date. Such a survey should be extended from the mouth of the river northward to Baja Point and then westward to the Gulf of Paria opposite Icacos Point, Trinidad, also southward to the Moruca River, to connect with the British survey made in 1887, and should be sufficiently in detail to permit the construction of a good chart on a scale of one inch to the nautical mile.

MEMORANDUM CONCERNING THE SOUTH COAST OF CUBA.

The south coast of Cuba has never been regularly surveyed. The information which is necessary for the construction of a reliable chart does not exist. The reports of navigators who visit the localities where soundings and shoals are delineated, state that the existing charts are wrong. The portion of this coast which most needs examination is that lying between Cienfuegos and Cape Cruz, which is lined, for the most part, by a belt of water varying in depth from 2 to 12 fathoms and studded with cays and submerged rocks. This belt is bounded on the south by a barrier of cays and reefs, beyond which the bed of the ocean sinks abruptly to a depth of 1,000 fathoms.

It is important that the geographical positions and outlines of these cays should be well determined, and that the channels between them leading into the shallow belt which skirts the coast of the island should be reliably charted. Owing to the nature of the ground to be examined it would be inadvisable to attempt a cursory and incomplete survey of the whole of this region, which has a length of more than 200 miles and an average breadth of 30 miles; but it would be permanently better, in case the time is limited, to thoroughly examine the most important entrances, such as Boca Grande, Caballones Channel, Pit jaya Channel, Barcos Channel, and Balandras Channel, and accurate to locate these channels and the light-house on Cape Cruz, the coa and adjacent cays between 79° 20′ and 79° 40′ W., Masio and Casilo ports, and the light-house on Colorados Point, at the entrance of Cie fuegos.

The United States consul at Santiago de Cuba has recently repor large errors in the delineation of the coast line between capes Cruz : Maysi, and requested that steps be taken for an examination of coast. Last winter the officers of the U. S. S. *Yantic*, Commanu Rockwell, U. S. Navy, commanding, found, by careful determinatic that the frequented harbor of refuge of El Portillo, lying to the w ward of Santiago de Cuba, was 6 miles east and 4½ miles north of t position assigned to it by all nautical charts.

DEEP-SEA SOUNDINGS.

The U. S. S. *Dolphin*, Commander George F. F. Wilde, in the mon of September of last year, ran a line of deep-sea soundings from Madei to Bermuda at intervals of 100 miles, at an average depth of 3 fathoms, with bottom temperatures, with the delay only of an ho morning and evening, the vessel meantime running at half power : making 200 miles a day on her passage, and in all these soundings n a single thermometer, specimen cup, or fathom of wire was lost, nor w there any failure to get bottom.

Seeing how little delay and expense there is in sounding when makii a passage, if intelligently done, I suggest that more vessels be furnish with sounding machines, which are inexpensive and take up but litt room.

All reliable deep-sea soundings which have been observed in North Pacific Ocean have been plotted on fifteen sheets, constructed a common scale of 1½ inches to the degree of longitude; and fifte additional sheets have been constructed to receive the existing da referring to the South Pacific Ocean, but the work has been discontinu since March to provide for a re-enforcement of the Division of Cha Supply.

The practical significance of this work is great. In the Pacific Oce more than twenty-five hundred doubtful dangers have been reporte and the collection of this data constitutes the most direct and econ ical method of finally establishing or disproving their existence. Un the general character of the formation of the bottom of the Pacific h been worked out, there will be no reliable guide to assist in estimatin the value or probable truth of the reports of shoals and dangers.

Some points of general topographical interest which should be se tled as early as possible are, (1) the western limit of the Patagon plateau, (2) the western extension of the deep area about the Phœni Islands, (3) the northward and eastward limits of the 4,000 fatho area off Japan and Kurile islands, (4) the development of the deptl at the western extremity of the Hawaiian Islands, (5) the extension the northward and southward of the 3,000-fathom trough off the coa of Peru.

Lines of soundings off a range of reefs, as on the east side of tl Gilbert and Ratack islands, where the reefs face the deep ocean, especially useful because they bring out strongly the ranges of heigh or ridges existing over the oceanic area.

Already indications are seen which show that the final bathymetr chart of the Pacific will be very different from those which have hitherto been published. There are many scientific problems which a thorough deep-sea survey would afford; and the work is large and important enough to call for the co-operation of all the great nations in accomplishing it. Thus far, the United States stands first in the amount of deep-sea work done in this great ocean.

In connection with this subject, an investigation has been undertaken to establish the maximum distance apart at which soundings should be taken to develop the existence or prove the non-existence of submerged dangers in the open ocean, with a view of fixing the ideas of navigators upon the subject of searching for reported dangers. It involves, as the chief consideration, the determination of the general form and size of a submarine formation, consisting of the materials which compose the earth's crust, which could be thrown up from the bottom of the ocean to the surface and remain standing under its own weight and the weight of the superincumbent body of water. The general shape of such a formation is that of a solid of revolution made by revolving one side of the outline of a vertical section around the axis, and its minimum size and proportions would be such that the combined weight of the formation and the water standing above any section would be equal to the strength of that section to resist crushing.

During the year important information concerning deep-sea soundings has been received from the sources indicated in the following tables:

Soundings.

Ship.	Commander.	Locality.
U. S. S. Dolphin	George F. F. Wilde	North Atlantic Ocean.
Swatara	John McGowan	South Atlantic Ocean.
Thetis	C. H. Stockton	Bering Sea.
Adams	J. J. Hunker	Samoan Islands.
Fish Commission steamer Albatross.	Z. L. Tanner	West coast of United States, Mexico, and Alaska.
British S. S. Missouri	H. H. Murrell	Bank of Newfoundland.
Buccaneer	D. Wilson Barker	Coast of Brazil.
Mina	S. Trott	North Atlantic Ocean.
Isabella Balcom	E. A Armstrong	East coast of Africa.
Silvertown	India Rubber G. P. and Tel. Co.	West coast of Africa.
Relay	C. and S. American Cable Express.	West coast South America.

GREAT CIRCLE SAILING CHARTS.

The great circle sailing charts of all the oceans, completed by the division of chart construction, have been adopted for the purposes of instruction in the Nautical School of Hanover, Germany. They have been subjected to a critical examination by the Germans, apparently with a view of determining their trustworthiness for the educational and practical uses of German navy and marine. The report upon this examination is published in the Annalen der Hydrographie, Berlin, 1890, No. V, pp. 161–172, in an article entitled "The New American Great Circle Sailing Charts," by Dr. G. D. E. Weyer, professor in the University of Kiel, Germany. The following is a brief of it:

An excellent cartographic work, that has up to this time been wanting, has lately been completed by the United States Hydrographic Office. It consists of five charts on the gnomonic projection, covering the North Atlantic, South Atlantic, North Pacific, South Pacific, and the Indian Ocean.

As is known, the purpose of such charts is to serve as simple aids i finding the shortest route between two distant ports, and the cours which has to be gradually changed in order to keep the ship on shortest track. Since the parallels of latitude are projected on gnomon charts as conic sections, the exact construction of such charts, measurement of courses and distances become quite difficult, be the more distant portions from the point of tangency of the projec become considerably distorted. This is an unfavorable circumstanc which is, however, compensated by the great advantage that the short track between any two points on the chart always is a straight line, characteristic that is not peculiar to any other projection.

By the method of subdivision employed the latitude and longit of any point of the shortest track can be read off directly to the ne one-sixth degree on the Atlantic, and the nearest, one-fourth degree o the Indian Ocean and Pacific charts, the subdivisions on the latter b ing far enough apart to allow an estimate to within 5 minutes.

The report enters then into a very detailed investigation of the fi charts, by going over the examples on each and by comparing the resul of different tests by computation and measurement for finding great circ distances and courses, for locating the track when one of its end poin falls beyond the limits of the chart, and for all the various other cas that may occur, including composite sailing.

Differences between computation and measurement, due to unequ contraction of the paper after printing, were found comparative small, so that, for instance, in the investigation of the Indian Oce chart, Professor Weyer remarks that it shows an exactness which wou hardly have been expected from general charts covering such la portions of the globe.

The report goes on to say that by means of these five charts all po sible cases of great circle sailing are covered in an exhaustive manne and they will be welcome as a valuable addition to nautical science t all interested on the subject, and in the future they will be remember as a commendable work of our times.

That the methods of measurement have been brought on these char into a practical form for nautical use, a thing that had not been acco plished before, also deserves grateful acknowledgment.

As desirable in a new edition of the charts, Professor Weyer su gests the addition of the circumference which has for its diameter i distance from the point of tangency to pole, and which intersects ea meridian in the point that lies at the shortest distance from the poi of tangency, in order to facilitate the measurement of distances by second method, which was thoroughly discussed at the time a meth for measuring distances on these charts was chosen, and which w first submitted to the Hydrographic Office in 1881, in a printed phlet by Mr. Gustave Herrle, chief draughtsman.

TERRESTRIAL MAGNETISM.

A chart of the lines of equal magnetic variation on the west coast South America has been constructed in connection with the curr work in that region, and a similar chart for the coasts of China and East is in progress.

The record of magnetic observations at sea and the record of ma netic observations at shore stations have been much extended. In latter record the collection of the observed values of the variation of compass at ten stations, in addition to those referred to in the last annual report, have become sufficient to warrant the deduction of empirical quotations for predicting values of the variation and assigning rates of secular change. Tables giving the variation and rate for any year at these places are given in the appended divisional report.

The observations for magnetic intensity, dip, and variation made by Lieut. Charles Laird and Ensigns Holcombe and L. M. Garrett, U. S. Navy, of the United States telegraphic longitude expedition, under the command of Lieut. J. A. Norris, U. S. Navy, have furnished valuable additional results at Vera Cruz, Coatzacoalcos and Salina Cruz in Mexico, at Puerto Plata, Island of Santo Domingo; at Santa Ana, Curaçao, and at Laguayra, Venezuela.

These observations have been computed in the division of chart construction, and are prepared for publication together with the constants of Kew theodolite magnetometer No. 54, and the instructions which accompanied it.

THE RECORD OF GEOGRAPHIC POSITIONS.

The work of collecting and recording measurements of meridian distances, and relating them to reliable determinations of secondary meridians, has been continued.

The first of a series of extracts from this work, comprising the geographic positions of South America, is ready for publication. It gives the sources from which the data are derived and the values of the secondary meridians upon which the resulting longitudes depend. Fourteen secondary meridians in this region have been determined by United States naval officers by telegraphic measurements to the established meridians of the United States and Europe, and nearly all chronometric measurements have been related to one or more of them.

THE OPERATIONS OF THE LATITUDE AND LONGITUDE PARTY OF 1889 AND 1890.

The expedition for the telegraphic determination of longitudes in the West Indies and on the north coast of South America left Washington on board the U. S. S. *Despatch* on November 5, 1889. The party consisted of the following-named naval officers, viz, Lieut. J. A. Norris, in charge, Lieut. Charles Laird, and Ensigns L. M. Garrett and H. B. Wilson. Upon arriving at Hampton Roads on November 6, the expedition embarked on the U. S S. *Yantic*, Commander C. H. Rockwell, U. S. Navy, commanding, and sailed for Santiago de Cuba the same day. The *Yantic* had been detailed for transportation of the party on account of the very uncertain means of communication between some of the places to be visited.

The expedition arrived at Santiago de Cuba on November 14, and arrangements were at once made with the authorities for the setting up of the observatories and instruments. The use of the submarine cable from this point to Laguayar, Venezuela, had been generously granted by the French company owning it. The point occupied here was the one determined in 1875 by Lieut. Commander F. M. Green, U. S. Navy. The authorities here, as at all places visited, were very polite and did everything in their power to facilitate the work.

Lieutenant Laird, with Mr. Garrett as his assistant, remained at this station while Lieutenant Norris and Mr. Wilson proceeded to St. Nicholas Mole, Hayti, in the *Yantic*, arriving on November 18. At this place a fine harbor and delightful climate were found, but not much else favorable position was found for the observatory, close to the telegi office. The instruments were set up and everything was ready for on the 22d. A delay was caused by the illness of Lieutenant L who was taken with malarial fever, but on the 28th he was ready duty, and observations were made and time signals successfully changed. The weather was good at both places and no trouble found in observing the stars. The officials of the telegraph com were exceedingly polite and obliging, and did much to render the successful. Observations were made on six nights, and then Lie ant Laird was directed to proceed in the *Yantic* to Port Plata o north side of San Domingo, which was the next station to the teleg line. It had been the intention to make magnetic observations at tiago de Cuba, and Lieutenant Laird was provided with instru for that purpose, but yellow fever broke out in the town, which i healthy at best, and it was deemed wise to get the party away there as soon as possible.

Lieutenant Laird arrived at Port Plata on December 9, and ready for work on the 13th. Much delay was experienced her account of the weather. Rains were almost continuous, but by ta advantage of every opportunity the series of observations was pleted on the 20th and on the 21st. Lieutenant Norris and party s for San Domingo City on the *Yantic*, arriving on the 24th. It bein holiday season and the natives being disinclined to work, some d was experienced here in getting ready for work.

The anchorage off the town being insecure and very uncomfort on account of the very heavy swell, the *Yantic* did not remain, bu soon as the instruments, etc., were landed, went to Samana Bay, w the anchorage was good, and where some necessary repairs to boilers were made.

Everything was ready for work at San Domingo on the 31st, an the 6th of January, 1890, the observations were completed. The graph line overland from Port Plata to San Domingo was found n belong to the company that owned the submarine cables, but its was readily granted by the director in charge at San Domingo. U the completion of this measurement, the *Yantic* went to Port Plata took Lieutenant Laird and party to the island of Curaçao, arrivin January 17. The measurement from San Domingo to Curaçao completed on January 25, and Lieutenant Laird and party then to Laguayra, Venezuela, arriving on February 3.

The measurements from San Domingo to Laguayra were made d by connecting the ends of the cable at Curaçao. It was complete February 11. A few days were occupied by Lieutenant Laird in ing magnetic and latitude observations, and then the instruments packed and the party embarked on the *Yantic* for the United St On February 21 the ship arrived at San Domingo, where Lieute Norris and party were taken on board. The ship then sailed for West, arriving on March 7.

The instruments and observations were shipped to Washingto steamer, and the officers of the expedition proceeded to the same p by rail, arriving on March 11.

By the work of this expedition the positions in latitude and lo tude of the following places, viz, St. Nicholas Mole, Port Plata, Domingo City, Curaçao, and Laguayra, have been determined. last-named place being on the mainland of South America, and b connected by telegraph with several other points on the coast, affords a starting point for their determination, which will be of great value, and the whole of that coast is known to be more or less incorrectly determined.

Only one set of magnetic instruments was supplied to the expedition, and it was used by Lieutenant Laird at all his stations, except Santiago de Cuba.

DERELICTS.

The plotting and tracking of floating wrecks on the Pilot Chart brings vividly to the eye one of the dangers that besets navigation in the open sea in these days of high-speed vessels. Seeing how these derelicts are dotted here and there on every issue of the Pilot Chart is it to be wondered at that vessels go to sea and are never again heard of?

The subject of the destruction of derelicts was considered by the International Marine Conference, and while it was found impracticable to decide on any international system, it was suggested that each nation patrol its own coast for the destruction of these dangers to life and navigation.

I desire to bring to your attention what has been urged before, the necessity of the Navy establishing an organized system for the speedy destruction of all derelicts on or near our coasts in the paths of navigation.

While the expense of this work should be entailed more properly on the civil than the naval establishment, the facilities and proper knowledge for the execution are alone to be found in this Department.

A twin-screw vessel of sufficient speed and size to keep the sea in bad weather, with headquarters at Sandy Hook, Delaware Breakwater, or Hampton Roads, would find no trouble in keeping the paths of navigation clear on our Atlantic coast. The *Despatch* and men-of-war generally are not adapted to this work. The following extracts from the Pilot Charts of January and July of this year are fair samples of the dangers from derelicts that menace vessels navigating on our coasts:

DANGEROUS OBSTRUCTIONS TO NAVIGATION REMOVED.

The U. S. S. *Despatch*, Lieut. W. S. Cowles, U. S. Navy, commanding, has been engaged during the past month searching for and removing obstructions to navigation about the entrance to Chesapeake Bay. On December 7 the *Despatch* found the derelict schooner *Joseph Souther* in latitude 37° 08′ N., longitude 75° 12′ W. She was bottom up, lumber laden, 18 inches out of the water aft, and nearly awash from amidships forward, no spars nor wreckage visible. An attempt was made to tow the derelict by means of a chain bridle and hawsers, but it was found that she was anchored by her chains, masts, and wire rigging. Torpedoes were exploded alongside of her but failed to break her up, so that the attempt had to be temporarily abandoned. She was found in about the same position on December 12, and was finally towed into Hampton Roads. The Red Star Line tug *Argus* assisted, and the services of a diver were also necessary, to clear her from her anchors and other gear. The dangerous character of this obstruction is illustrated by the fact that nineteen reports were received of her in less than a month and a half.

DERELICTS TOWED IN AND WRECKS DESTROYED.

The derelict schooner *Mabel L. Phillips* was picked up by the tug *Gladisfen*, July 7, 25 miles east of St. David's Head, Bermuda, and towed into port; she was abandoned off Hatteras last October. The U. S. S. *Despatch*, Lieutenant Cowles, blew up a sunken wreck 15 miles N. E. of Bodie's Island light, June 25. The U. S. S. *Yantic*, Commander Rockwell, destroyed a dangerous wreck 8 miles ESE. from Absecon, June 25.

GENERAL RECOMMENDATIONS.

These have all been given separately under the sections to which they especially refer, relating chiefly to the increased appropriation for the branch offices, the purchase of printing presses and type for nautical publications, the extension of the pilot charts, etc., and the great necessity for a new building especially adapted for the needs of the Hydrographic Office. An inspection of that now occupied by the division of chart construction, where the draughting, engraving, and printing is done, will show the necessity.

Very respectfully,

Henry F. Picking,
Captain U. S. Navy, Hydrographer.

Commodore F. M. Ramsay, U. S. Navy,
Chief of the Bureau of Navigation, Navy Department.

Branch Hydrographic Office,
Boston, Mass., July 1, 1890.

Sir: I have the honor to submit the following report of this office for the year ending June 30, 1890.

On January 20, 1890, I relieved Lieut. John Downes, U. S. Navy, and assumed charge of the office; about the same time Mr. William S. Oliver, of the light-house inspector's office, very kindly took charge of the work at Portland, Me. He carried on the work with great success, and collected a great deal of valuable data, especially when we consider that he also had to attend to his duty in the light-house inspector's office. Unfortunately at times he is called away on duty, when his work for the Hydrographic Office ceases, and much valuable information is lost. I think, if possible, something should be done to compensate him for his excellent work.

Portland, Me., I am satisfied, is of sufficient importance to have a branch office, therefore I suggest as soon as the appropriation will allow, one be established there with an officer in charge.

The ice has been very early in making its appearance this year, consequently this office has been visited by nearly every captain of the transatlantic steamers from this port.

The returns of records have been very good, showing signs of great care and a perfect understanding of the method of keeping them; still, there are a few records received that are poorly kept, and are of very little value; this comes from the fact that the observer did not understand the instructions in front of the marine meteorological reports; therefore I suggest the following additions:

The illustrations of the forms of clouds.

In the instructions (on the back of the rules for the use of oil), after the words, in italics, "Greenwich mean time," add "that is, when the chronometer, with the error applied, shows twelve hours."

After the words "local time at which taken" add "that is, the time shown by the ship's or deck clock."

For the barometer instead of "8 a. m. or 8 p. m.," insert "8 a. m., noon, or 8 p. m.," and add "when the barometer is mercurial its height above the sea, and the reading of the thermometer attached must be taken, in case the thermometer attached is broken put a thermometer within a few inches of the barometer and read it."

If the barometer is an aneroid, take the height above the sea v it is read, tapping the barometer lightly before reading it.

Also the first page should be filled out as a sample.

Some of the above additions may seem very simple and even unnecessary to one who is accustomed to this kind of work, but to a new observer, unacoustomed to barometers and their causes of error, the instrnctions can not be given too minutely.

The envelopes given out with the Meteorological Journals (form 105) are all addressed to Washington, D. C., and consequently go direct, this decreases very much the number received and forwarded from this office.

I would also suggest as soon as sufficient data can be obtained that the positions of the warm and cold bands, to the eastward of the Grand Banks, be put on the monthly Pilot Charts; they will be of use to navigators, in thick weather, in determining their longitude approximately, and will show strangers that the changes of temperature are natural and that there is no cause to stop, as many do now who are not aware of these bands of varying temperature.

In regard to the use of oil, there is no longer any doubt as to its efficacy, as nearly every vessel leaving this port has the appliances for using it in case of heavy weather.

The subject of removing derelicts from the track of commerce on the ocean is one demanding serious consideration. Occasionally a captain will stop and set fire to one of them, sometimes removing the danger, but in many cases they only burn to the water's edge and, if lumber laden, become more dangerous than they were before. They should be blown up or towed into the nearest harbor.

I have received many complaints concerning the buoys in Nantucket and Vineyard Sounds; they seem to be too small; the desire is to have all spar buoys replaced with can or nun buoys and in winter where the can or nun buoys have to be taken up very large spar buoys be placed in their stead.

I desire particularly to call your attention to the totally inadequate quarters provided for this office, and earnestly request that nothing be left undone that would lead to their improvement. It is only necessary to see the present quarters to be impressed with their want of adaptability for the duty performed in them. As the accuracy of the work is of the first importance, I am of the opinion that proper accommodations are of more importance than an increase of force, as we then could undoubtedly do twice as much work as we do now. When any one is in the office for information the space is so small that all other work must necessarily cease; also, it is impossible for more than three to obtain information at the same time. It is to be hoped that the necessary appropriations will soon be made, which will enable this branch to be made a place becoming the dignity and utility of a Government office.

In connection with ship visiting the use of a steam-launch for a few hours each day would be of great value, as the rapid extension of the water front of this port is rendering the work of the ship visitor more and more arduous each year. It is now impossible for one assistant to keep pace with the arrivals. Should the Revenue Marine be turned over to the Navy, the use of a launch may be obtained from that source at a very small expense.

The Boston Post publishes an abstract of the Pilot Chart each month and has assisted in bringing the office before the public.

I wish particularly to call your attention to Mr. L. M. Lee, the assistant in this office. He is courteous and obliging, and, above all, is eminently able to discuss intelligently all questions of nautical interest. I wish to urge you to do all in your power to increase his compensation, for he has worked well and faithfully for over six years in this office and deserves all that you can do for him. His personal acquain among the sea-faring men from and trading to this section of the co is of great value to the office in obtaining data.

I suggest that a report be made by each officer in charge of a bran office, giving in detail the method of keeping the records of his offi giving forms, describing manner of visiting vessels, comparing baro eters, etc., and what reports he takes from the daily papers; and fro these reports there be compiled a set of instructions for officers charge of branch hydrographic offices. This I think will lead to bett results and more uniformity in our yearly reports, and be of the grea est importance to any one taking charge of an office for the first t

I believe that it would be beneficial for the officer in charge to v at times the larger ports in the section of his office.

In concluding my report, I wish to state that from all the Treasu Department officials and employés in the custom-house, from various firms and members of the shipping community of this ci from the press, and from all with whom the office has been brought contact we have received unvarying kindness. Our thanks are due all who have shown their appreciation of the work of the Hydrog Office in behalf of the merchant marine of the world.

The appended table, marked A, presents concisely, in detail and a gregate, the work performed by this office during the past year.

A.

	1889.						1890.						To for ye
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Information forwarded.													
Reports:													
Trade-wind	52	81	34	53	56	72	16	39	65	79	68	62	
Ice	9	7	4	6	2	2	8	36	21	18	32	34	
Wreck	28	11	29	19	33	11	11	20	18	21	56	54	
Fog	36	29	20	19	13	9	8	11	29	14	33	32	
Storm	11	7	30	25	30	34	26	35	46	38	35	19	
Use of oil	......	......	6	2	8	4	......	1	1	2	1	......	
Current	2	......	......	......	1	1	......	1	1	......	1	......	
Meteor	......	......	1	......	......	3	3	......	......	......	......	......	
Water-spout	1	1	......	......	......	......	2	1	......	1	1	2	
Whale	3	3	2	4	1	1	2	......	......	1	1	3	
Sounding, reef and shoal	2	......	2	......	......	......	1	......	......	2	4	1	
Eclipse	......	......	......	......	......	......	1	......	......	......	1	......	
St. Elmo's fire and electric storms	......	......	1	2	1	1	2	1	2	6	5	8	
Buoys, out of place or order, or adrift	6	2	2	1	1	4	6	5	11	12	7	13	
Light-ships, new or adrift	1	......	......	......	......	......	......	......	......	......	1	......	
Meteorological journals	......	......	......	......	......	......	......	......	......	1	......	......	
Greenwich noon reports (Form 105)	48	32	35	35	31	33	25	49	62	50	96	57	
Special abstracts of logs	2	5	7	3	4	3	6	3	2	4	3	4	
Track charts	......	......	......	......	......	......	......	......	1	2	......	......	
Barometer curves	......	......	......	......	......	......	1	5	1	2	2	6	
Thermometer curves	......	......	......	......	......	......	1	5	3	8	4	2	
Unusual phenomena	1	......	2	......	......	4	7	1	2	6	6	1	

A—Continued.

	1889.						1890.						Total for the year.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Information forwarded—cont'd.													
Whirlwinds	......	......	......	......	......	2	1	1	......	......	......	......	4
Ice disasters	......	......	......	......	......	......	......	......	1	2	1	......	4
Tide rips	1	......	1	......	......	......	......	......	......	......	......	......	2
Gulf-stream reports	......	......	......	2	2	2	1	5	4	7	2	......	25
Articles distributed.													
Pilot Charts	316	419	223	349	367	357	331	300	378	353	420	391	4, 397
Weekly bulletins to P. C	2, 077	2, 565	2, 104	1, 832	1, 443	1, 067	1, 991	1, 676	1, 732	1, 208	2, 092	1, 733	21, 520
Notices to Mariners	17, 500	15, 081	17, 680	17, 045	16, 261	15, 077	13, 383	15, 752	17, 360	19, 277	22, 822	29, 976	217, 214
Notices to Mariners, C. S	128	182	296	255	147	108	105	98	229	286	127	182	2, 143
Light Lists	96	......	53	56	25	1	24	50	39	37	152	142	675
Beacon and buoy lists	152	41	152	330	344	245	300	394	452	569	517	589	4, 085
Meteorological journals	......	......	......	......	......	......	1	......	......	1	......	......	2
Greenwich noon reports [Form 106], sets	30	29	24	29	27	31	23	20	24	23	38	23	321
Rules of the Road	120	65	47	11	70	42	42	53	72	105	83	162	872
Weather reviews	46	155	64	84	96	101	44	68	110	47	127	69	1, 011
Bottle papers	......	......	......	......	......	172	222	72	72	230	356	318	1, 442
Trade-wind forms	......	......	......	......	......	58	......	......	......	......	......	......	58
Ice blanks	......	......	......	......	......	......	......	......	192	6	16	......	214
Information to individuals	2, 100	2, 027	1, 927	2, 060	1, 304	1, 145	1, 342	1, 724	1, 765	1, 805	2, 001	1, 926	21, 126
Work performed.													
Vessels visited	198	269	260	327	201	321	132	170	170	186	327	230	2, 781
Barometers compared	200	222	285	344	276	480	321	217	213	192	228	217	3, 194
Thermometers compared	......	......	......	......	......	......	......	4	......	......	1	......	5
Letters of acknowledgment	96	66	70	71	62	66	60	98	124	110	182	122	1, 127
Charts corrected, distributed, etc	......	......	......	......	2	......	1	2	2	12	2	......	21
Weekly bulletins corrected	......	......	......	......	......	......	......	......	350	......	......	......	350
General information	......	......	......	......	......	......	......	1	1	......	......	......	2

Very respectfully,

D. PEACOCK,
Lieutenant, U. S. Navy.

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE,
New York, N. Y., July 7, 1890

SIR: I have the honor to submit the following report of this of for the year just closed:

On January 10, I relieved Ensign George P. Blow and assumed cha of the office. During the greater portion of the first half of year the office was very active in collecting data bearing upon work of the Marine Conference, and the methods adopted by En Blow for the purpose were productive of most excellent results. Si his departure numerous visitors have called at the office, all of wh were greatly interested in the various subjects before the Confere but expressed very little satisfaction with the results attained. general sentiment seems to be that the matter will have to be gone o again and the many vexed questions settled, and that the subjects for Congress to pass action upon should receive attention during present session, on the ground that as this was the first country t brought the delegates together it should be the first to take action the subjects left to the various governments to act upon.

In connection with this matter, various methods for signaling in th weather, the distribution of oil, boat-detaching apparatus, and so fo have been from time to time submitted for the opinion of the office charge of this office.

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You are already in possession of the facts relating to a propo change in location, which will bring both offices in one inclosure give a better chance for the supervision of affairs by the officer charge. A total absence of natural light makes it difficult to prop attend to matters in that portion of the office devoted to correspo ence, besides which it is ruinous to the eye-sight of those who obliged to work by gas-light, which, during the dark winter days, is too dim for the purpose. I can not too strongly urge this change, a as far as the office is concerned, it would be a matter of great regret through a failure to obtain the additional appropriation requested rental, the location of the office were changed to some other buildi

The subject touched upon by the Pilot Chart that has been of gre est interest is that which relates to the ice movement, and reque come from many sections of the country for these valuable "ice ma as they are popularly called. The unusually large quantities of ice t season have made the Pilot Chart and the weekly bulletin of more th usual value, and from conversations with a great number of master transatlantic steamers we find that they have been of great value warning vessels against the ice and fog of more northerly routes.

What many of the slower vessels seem to dread more than anythi else is meeting one of the "grayhounds" in thick weather. The trou seems to be that the swift passenger-carrying vessels do not keep bl ing their fog whistles on account of arousing the fears of their pa gers. From what I have been able to judge myself, however, larger and swifter vessels seem to be run with greater care and precautions than any that cross the ocean. I merely give the above having been called to my attention rather than because any great weight is to be given to the complaint.

The increase of the size of the Pilot Chart and the addition of the storm signals are both considered as improvements, as is also the table showing the sea-water temperatures. The diagrams for practical use in West Indian hurricanes, with the accompanying paragraphs of general information and rules for actions, apparently answer the purpose of those who cruise in the limit covered by the diagrams much better than the former methods adopted for a similar purpose.

Several times the office has been called upon in relation to a proposed expedition to the north magnetic pole. The various scientific reasons that are advanced to prove the necessity for such an expedition are already familiar to you and need no dwelling upon. The practical features of the undertaking may not, perhaps, have been brought to your notice, and I submit a few of the features of which I am cognizant. The chances are that the matter will be assisted by the National Academy of Sciences, and very possibly by private parties. As the result will be of considerable moment to the Hydrographic Office it would seem to me highly desirable that an active interest should be taken by that office in the personnel and organization of the expedition. Instruments of precision may, very possibly be already obtainable, but are there available officers who are sufficiently well trained in their use to make their services of such value as to recommend them for such duty? The Army has already done something in high-latitude work, although nothing in the direct line suggested. It would seem to be a desirable field for the Navy; as it now looks as if the expedition would get away in the summer of next year, I would respectfully suggest that the necessary steps be taken to have the office represented by practical observers. The time required for the work will certainly be two seasons and probably three, which would require an absence of about two years and a half.

The vacancy created in this office by the resignation of one of the ship visitors has never been filled, so that that part of the work has devolved upon one of the assistants, who finds it impossible to carry out the system at one time in vogue, that of reading the barometers of all incoming and outgoing craft, so that there could be two standard reading of the barometers while in this port. The new method of using only the mercurial barometer for comparison, and doing away altogether with the aneroid from the office, adds considerably to the work, and has not been in use a sufficent length of time to show whether there is the expected improvement in the comparisons or not.

Upon the receipt of the circular letter relating to barometer comparisons our office standard barometer was compared with the Kew Standard of Mr. Henry Green, of this city, and found to be exactly correct, while comparisons made with the Signal Service barometer show a slight error. Doing away with the use of the aneroid, usually taken by the ship visitor, adds considerably to the work of the office and introduces somewhat of an element of uncertainty; the actual height of the barometer at the time of comparison, which, although a slight matter to overcome, sometimes is inconvenient. The difference of draught between ships when light and when loaded is no inconsiderable matter, and where time is a very important consideration the amount lost in endeavoring to attain the required information is in the aggregate more than we can spare for the purpose.

The only complaint in the matter of barometer comparisons made to this office have been that there have been no corrections of barometers for such and such a length of time, which was solely due to the fact

BRANCH HYDROGRAPHIC OFFICE,
New York, N. Y., July 7, 1890.

SIR: I have the honor to submit the following report of this office for the year just closed:

On January 10, I relieved Ensign George P. Blow and assumed charge of the office. During the greater portion of the first half of this year the office was very active in collecting data bearing upon the work of the Marine Conference, and the methods adopted by Ensign Blow for the purpose were productive of most excellent results. Since his departure numerous visitors have called at the office, all of whom were greatly interested in the various subjects before the Conference, but expressed very little satisfaction with the results attained. The general sentiment seems to be that the matter will have to be gone over again and the many vexed questions settled, and that the subjects left for Congress to pass action upon should receive attention during the present session, on the ground that as this was the first country that brought the delegates together it should be the first to take action upon the subjects left to the various governments to act upon.

In connection with this matter, various methods for signaling in thick weather, the distribution of oil, boat-detaching apparatus, and so forth, have been from time to time submitted for the opinion of the officer in charge of this office.

Ensign Blow, while in charge, made several excellent changes, whereby more room has been gained in the office. The work, too, has been greatly simplified, and consequently it can now be carried on more rapidly and systematically than was formerly possible. The quarters are, however, still too cramped, and are entirely inadequate for the proper performance of the routine work, and the fact that the office is located in two different portions of the floor of the exchange has a tendency to delay business.

You are already in possession of the facts relating to a proposed change in location, which will bring both offices in one inclosure and give a better chance for the supervision of affairs by the officer in charge. A total absence of natural light makes it difficult to properly attend to matters in that portion of the office devoted to correspondence, besides which it is ruinous to the eye-sight of those who are obliged to work by gas-light, which, during the dark winter days, is far too dim for the purpose. I can not too strongly urge this change, and, as far as the office is concerned, it would be a matter of great regret if, through a failure to obtain the additional appropriation requested for rental, the location of the office were changed to some other building.

The subject touched upon by the Pilot Chart that has been of greatest interest is that which relates to the ice movement, and requests come from many sections of the country for these valuable "ice maps" as they are popularly called. The unusually large quantities of ice this season have made the Pilot Chart and the weekly bulletin of more than usual value, and from conversations with a great number of masters of transatlantic steamers we find that they have been of great value in warning vessels against the ice and fog of more northerly routes.

What many of the slower vessels seem to dread more than anything else is meeting one of the "grayhounds" in thick weather. The trouble seems to be that the swift passenger-carrying vessels do not keep blowing their fog-whistles on account of arousing the fears of their passengers. From what I have been able to judge myself, however, the larger and swifter vessels seem to be run with greater care and more precautions than any that cross the ocean. I merely give the above as

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that the office has been unable to send the observer around owing to a pressure of duties in other quarters.

A visit made to the suboffices under control of this office showed that a considerable interest was taken in all matters connected with its publications, and that there was a general willingness to act in concert with the office as far as this could be done by talking the matter over with the sea-faring men who visited the suboffice and sending them the notices to mariners, pilot charts, etc. Boarding the vessels was not to be thought of, however, unless either a boat could be furnished for the purpose or the expenses attending the work paid by the main office. Very many of the coasting captains seem willing to report anything that may be encountered, but do not care to fill out any forms. Sergeant Paul Daniels, Signal Corps, at New London, and Sergeant H. J. Cox, Signal Corps, at New Haven, were the only two professional observers that did work in connection with this office. At Bridgeport the harbor master is our representative, and at Providence Mr. John S. Austin, and Newport Mr. Lawton Coggeshall, the leading ship-chandlers. The reports sent from New London and New Haven have contained a great deal of important data, and I regret exceedingly that the office has lost the valuable assistance of Signal Service Sergeant H. J. Cox, who through a pressure of other duties was forced to give up working for this office. A small monthly payment for an assistant to aid him and look after his office during his absence, or to board vessels, would, I think, again secure us a valuable assistant in New Haven.

The important subject of derelicts is one that is constantly being discussed by shipmasters, who can not seem to understand why vessels that are from time to time reported as partially submerged, or as drifting about, dangerous obstructions to navigation, and whose positions are fairly accurately determined, are not at once sought for by men-of-war and destroyed or towed into port. The proposition already made, that a vessel be kept on our coast in constant readiness for this important duty, is again suggested, as vessels attached to the North Atlantic Squadron are not always immediately available, and promptness of action in such cases goes far toward convincing the public that their interests are among the first of our considerations.

The subjects of side-lights and their screens have been made a matter of especial investigation, and a circular letter was addressed to all coast lines that hail from this port. Personal visits were also made to as many of the steamers and sailing vessels as was practicable. The result shows that whereas the lights of the steamers are quite generally looked at by the United States inspector during his yearly inspection, it is, as a rule, taken for granted that the screens as placed by the builders are sufficient for the purpose. The masters of the vessels, however, in almost every case, have assured themselves that the rays of the two lights do not cross each other. As far as the sailing vessels are concerned, but little attention appears to have been paid the matter, a great deal seemingly being taken for granted; and, as far as could be ascertained, the vessels seldom, if ever, undergo regular inspection.

Some of the most important subjects taken up by this office during the year have been the collection of data in relation to the desirability of establishing a light-house between Jamaica and Greytown, as well as in the harbor of the latter place; the collection of special data regarding the storm of 1888, and of the cyclone off this coast in September, 1889. Reports of disaster of collision with the ice in addition to those already in the office were also collected and forwarded.

The office has also taken up the subject of the change of the limit of the Gulf Stream, which, owing to the mildness of the past two winters, has been a matter very largely discussed. Much valuable data has been obtained, and the conclusion reached is that the actual limits of the stream have undergone no change, and that the cause of higher temperature will have to be sought for elsewhere.

The valuable addition to the office charts of a complete set of British admiralty charts have been very much appreciated, and with them the office is in that particular very well equipped. Owing, however, to the very narrow limits of the inclosure in which the chart shelves are, it is necessary to have the doors of the lockers unshipped and kept off all day. This is very detrimental to the charts, which are covered with dust, and in addition there is no proper place for spreading them out for consultation.

The suggestions made by the masters of the large ocean steamers in relation to the change of buoyage in the main ship-channel were from time to time forwarded to the inspector of the light-house district, and the recent changes in the position of the buoys, and particularly the one off southwest spit, will be productive of a great deal of satisfaction, as the sharp turning formerly necessitated from the position then occupied is now done away with and the danger of grounding is avoided.

The many courtesies extended by the President, Board of Directors, and the Superintendent of the Maritime Exchange to this office and its employés have been most heartily appreciated, and the cordial relations that exist between the members of the exchange and this office have been of the greatest assistance in carrying on the work.

The press of this city has taken an active interest in aiding the dissemination of news in relation to approaching storms, dangers to navigation, and other matters of importance to the public. The New York Herald continues to publish the pilot chart, and the weekly paper, Ocean, has reproduced it for a portion of the year. The ship-news office and the news collector at Sandy Hook have kindly forwarded us news at the very earliest opportunity, and much of the data for the Mascart cablegrams is due to this promptness.

I take great pleasure in calling your attention to the zeal and ability displayed by the employés of this office, to whom much of its popularity is due.

The table given below is a summary of the work accomplished in this office during the past year. It will be noticed that several additional headings appear, notably the Mascarts, Gulf Stream reports, and October supplement. The Coast Survey notices to mariners, which in former reports have been included under the heading of Notice to Mariners, appear in this report as a separate item. The report of the amount of general information furnished has been really an estimate rather than actual count, and as it is impossible to keep accurate run of such data, I respectfully suggest its being omitted in the future. While in some cases there has been an increase in the totals under the various headings, in others there is a decrease; this latter is particularly noticeable in the distribution of publications and is due to a reduction in the supply received. Experience has shown that many pamphlets formerly distributed were duplicated, and in all such cases reduction has been made, which is apparent in the summary.

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Totals.
Information furnished.													
Reports:													
Trade-wind	67	88	95	85	45	21	36	34	44	123	42	21	
Ice	35	13	10	12	6	4	51	99	54	69	138	105	
Wreck	55	46	61	111	93	54	70	59	73	79	82	85	[illegible]
Fog	123	133	56	68	34	23	19	25	53	61	113	79	[illegible]
Storm	28	30	79	101	60	78	200	145	97	97	79	36	[illegible]
Current	1	2	2	5	10	12	7	2	2	6	6	......	[illegible]
Water-spout	2	2	1	......	2	1	8	......	3	1	......	5	[illegible]
Whale	......	1	......	1	1	1	1	......	......	2	......	......	[illegible]
Shoal	1	3	2	1	1	......	8	......	1	......	......	......	16
Buoy	8	18	7	13	10	7	5	7	2	3	4	8	[illegible]
Light-vessels adrift	......	......	2	1	......	1	......	......	1	......	......	......	5
Meteorological journals forwarded	......	1	1	4	2	......	2	3	1	6	2	......	[illegible]
Greenwich noon reports forwarded	204	217	174	260	176	175	225	206	170	281	282	191	2,357
Abstracts of logs	22	6	59	36	26	1	......	1	1	......	......	......	234
Track charts	1	4	5	4	1	1	......	1	......	2	4	3	47
Mascarts	......	......	......	......	......	......	......	......	23	68	95	91	[illegible]
Barometer curves	1	2	2	2	......	2	......	1	......	2	3	......	15
Wind curves	1	2	2	2	......	2	......	1	......	2	3	......	15
Soundings	1	......	......	......	3	......	2	......	......	......	......	......	6
Unusual phenomena	3	4	......	......	......	3	1	2	1	......	1	......	15
Use of oil reports	......	......	2	......	1	......	......	3	......	......	......	......	6
Gulf Stream reports	......	......	......	......	......	......	......	......	4	3	8	5	20
Articles distributed.													
Pilot Charts	1,053	1,030	823	1,016	879	887	840	788	904	829	993	970	11
October supplements	......	......	......	952	27	......	......	......	......	......	......	......	979
Supplements	712	876	700	875	612	580	425	606	589	580	787	580	7,[illegible]
Notices to Mariners	15,968	25,434	24,250	19,032	19,271	13,578	14,249	16,436	21,639	17,417	18,660	25,506	232,440
Light Lists	26	76	26	38	25	29	48	29	36	30	69	39	451
Day marks	32	33	19	259	24	45	112	75	104	62	......	97	[illegible]
Meteorological journals	4	......	......	1	6	3	4	3	2	......	......	......	23
Forms 105 (sets)	159	248	128	136	163	227	173	107	153	130	250	114	[illegible]
Pamphlets	94	38	42	107	56	150	10	250	49	33	34	20	
Hydrographic Office Charts	4	8	15	14	31	4	7	17	9	6	24	13	152
Coast Survey Notices to Mariners	4,600	7,312	5,436	2,636	4,723	11,328	3,462	4,757	1,497	3,179	2,594	3,522	55,046
Weather Reviews	98	80	100	93	93	70	75	104	99	61	163	101	1,137
Work performed.													
Vessels visited	542	737	530	780	545	526	488	530	557	556	687	560	7
Barometers compared	132	237	123	195	69	168	123	182	182	258	243	194	2
Acknowledgments written	246	292	206	280	193	187	213	216	337	294	276	217	2,
Special acknowledgments written	21	42	34	54	45	31	8	32	32	24	36	28	[illegible]
Trade-wind letters written	46	47	40	45	47	33	28	20	18	37	15	15	[illegible]
Storm-letters written	2	3	66	41	14	31	50	45	48	45	3	1	[illegible]
Letters requiring special information	10	15	53	22	11	17	43	35	21	15	9	7	[illegible]
Miscellaneous letters	......	......	......	......	......	......	......	......	......	......	......	......	465
Charts corrected	8	......	1	1	2	2	5	......	......	......	48	......	67
Day marks corrected	7	7	......	......	7	......	......	......	......	......	......	......	21
General information	5,255	6,870	5,360	6,615	6,575	6,465	6,200	6,430	6,215	6,355	6,780	5,815	75,435

Very respectfully, your obedient servant,

ARTHUR P. NAZRO,
Lieutenant, U. S. Navy, in Charge.

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE,
Philadelphia, Pa., July 1, 1890.

SIR: I have the honor to submit the following report of the operations of this office during the fiscal year ending June 30, 1890.

Lieut. W. P. Conway, U. S. Navy, who has been in charge of this office for over three years, was detached on May 24, and it is due to him to say that the present enviable reputation of this branch, as attested to by the Maritime Exchange and the local press, is largely owing to his energy and ability and his courtesy in rendering every assistance to the masters of vessels and others applying for information.

The office loses also by the detachment of Ensign H. B. Wilson, U. S. Navy, who, during his tour of duty, ably assisted Lieutenant Conway, and contributed, by his efforts, to increase the popularity of this service.

The methods of collecting and distributing information have been greatly improved and systematized; and, without going into details, it is only necessary to mention that during the fiscal year ending June 30, 1886, 3,660 Notices to Mariners, and their extracts, were circulated, while during the fiscal year just ended the grand total of 395,907 was reached, and a corresponding increase has taken place in every department of this office. It has been my aim to carry out the methods he inaugurated, but I find it impossible to do as much work with the present force, and I urge that another officer be ordered to this duty.

The office has now a complete set of sailing directions, and these are found to be of great use in supplying information to masters of vessels, but while the sailing directions furnish the details, a graphic representation of harbors and coasts, as shown on the charts, gives the information more readily and clearly, and in much less time, and I therefore recommend that the office be supplied with a complete set of British admiralty charts of parts of the world not covered by those of the Hydrographic Office.

The time ball on the top of the Commercial Exchange, formerly operated by this office, has not been in working order since last October, and as this ball is well placed and of great use to the maritime community it should be repaired and put in working order as soon as possible.

The allowance ($5 per month) for running expenses is entirely too small and each month is almost entirely expended in car-fare for the messenger. In order to make ends meet it becomes necessary to practice economy to a degree that can not be said to be to the best interests of the office. The allowance for this purpose should be at least $15 per month, and, with it, the messenger would then be able to make occasional visits to Thurlow, Chester, and Wilmington, and thus much valuable information would be collected which is now lost.

The following extract from the report of the board of directors of the Philadelphia Maritime Exchange, 1890, will be of interest.

> BRANCH HYDROGRAPHIC OFFICE.
>
> This department of the U. S. Navy, which is still located in the Exchange, has maintained its efficiency during the past year under the management of Lieut. W. P. Conway, assisted by Ensigns H. B. Wilson and James G. Doyle, and has continued to give satisfaction to the maritime community. It has always been the opinion of this exchange that this important aid to navigation should be more generously recognized by the national Government in the matter of appropriations, thus enabling it to extend its sphere of usefulness, and to this opinion the board still adheres.

The Maritime Exchange has kindly allowed its agent at Dela Breakwater, Mr. A. P. Ingram, to act for this office, and during year he has distributed much valuable information to masters of sels anchoring at the Breakwater.

The thanks of the office are due to the Maritime Exchange and t the shipping firms of the city for courtesies received and assistance rendered in carrying on its work.

The following table presents in detail the work done during the year:

	1889.						1890.						Total for fiscal year 1889-1890.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Reports forwarded.													
Trade-wind limits	18	23	5	10	6	9	17	10	1	......	4	3	106
Ice	57	18	13	9	1	5	36	134	77	125	102	171	74
Wrecks	74	84	124	179	97	93	115	84	84	66	64	46	1, 11
Fog	13	17	22	16	5	3	4	5	9	15	22	35	[illegible]
Buoys adrift	7	9	3	3	1	3	7	6	3	5	3	16	7
General information	1	5	7	14	12	12	2	6	3	4	7	3	7
Whales	......	2	......	......	1	......	......	1	......	1	......	1	6
Meteorological journals	......	......	......	......	......	......	......	......	......	2	......	1	[illegible]
Greenwich noon reports	50	43	60	70	44	52	60	59	59	89	65	80	
Data for Mascart cablegram	40	66	57	63	35	50	68	69	17	97	60	60	62
Storms	5	9	8	27	12	26	54	41	21	35	19	18	[illegible]
Unusual phenomena	1	2	......	3	2	......	......	......	1	1	1	......	11
Use of oil in storms	......	......	......	1	1	2	5	1	1	1	1	......	[illegible]
Currents	14	7	5	6	22	......	......	9	12	8	38	86	
Articles distributed.													
Pilot Charts	350	251	227	314	162	218	226	294	267	395	153	217	3
Supplements	......	......	......	254	13	3	4	2	......	......	......	......	
Notices to Mariners	27, 824	33, 765	26, 566	25, 784	26, 694	21, 872	20, 296	24, 016	38, 455	70, 074	45,		
Light Lists	55	38	38	36	26	23	18	11	40	47			
Buoy books	87	91	74	35	35	23	85	29	63	214		32	
Meteorological charts	......	......	......	......	......	......	......	......	......	......	12	......	[illegible]
Meteorological journals	......	......	......	1	......	2	......	......	......	3	2	2	[illegible]
Hydrographic Office charts	......	1	......	......	3	4	......	1	2	8	......	3	[illegible]
Signal Service weather reviews	103	48	58	79	72	87	91	45	43	76	90	60	
Miscellaneous publications	......	......	......	......	......	4	......	......	204	46	......	......	
Greenwich Noon Reports	74	53	24	36	41	47	25	55	43	68	33	39	
Nautical Monograph No. 5	12	8	......	......	2	7	6	5	......	5	1	......	
Work done.													
Vessels visited	165	196	142	107	137	125	141	127	126	184	145	176	1
Information furnished	1, 970	2, 192	1, 845	2, 473	1, 773	1, 550	1, 973	1, 543	2, 313	2, 992	2, 321	1, 900	24, [illegible]
Barometers compared	111	119	89	192	140	125	143	155	143	215	134	129	1
Thermometers compared	14	3	9	10	54	44	60	53	63	84	45	46	
Office charts corrected	72	227	144	160	179	240	174	116	175	152	143	170	1
Vessels' charts corrected	......	......	......	......	2	......	......	......	......	......	4	......	6

	1889.						1890.						Total for fiscal year 1889-1890.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Workdone-Cont'd.													
Vessels' light lists corrected	102	116	74	73	104	69	59	66	57	118	41	30	909
Buoy books corrected	34	41	52	25	46	10	77	52	114	60	64	70	645
Office light lists corrected *	......	......	......	......	......	......	......	......	......	......	......	......	......
Office sailing directions *	......	......	......	......	......	......	......	......	......	......	......	......	......

* Corrected to date.

Respectfully submitted.

JAS. G. DOYLE,
Ensign, U. S. Navy.

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE,
BOARD OF TRADE, 54 EXCHANGE PLACE,
Baltimore, Md., July 11, 1890.

SIR: I respectfully submit the following report of the work of this office for the year ending June 30, 1890:

On April 1 the office was moved from the board of trade rooms, where it had been located for seven years, to much better quarters in the custom-house. In its new location the office is more convenient and accessible to captains and all others who make use of it, and the number of callers has sensibly increased.

During the past year the work of collection and distribution of information useful to mariners has been steadily kept up, and though no claim is made of being a "general intelligence bureau," I am sure that the office has fulfilled the purpose of its establishment here.

Very few vessels come here that have not previously touched at some other United States port, but among the number several observers have been secured. Where a good observer is engaged it should be the policy of the office to recognize fully his work, as has been done lately; but in this connection I would suggest that the actual observer, and not the captain, should be written to when acknowledging reports. In cases under my own observation the captain of the vessel, who is utterly indifferent to the work, gets all letters of acknowledgment, while the subordinate officer who keeps the record is named only in a secondary way.

I would suggest that more definite instructions be given as to the sale of pilot charts; it has been the rule of this office to give a chart to every captain who applies, whether he keeps a journal or not. I have considered the nominal price of the chart simply as a check on outside, non-professional demands, and have not made the keeping of a journal the condition on which captains could get a chart free. Every master should be considered a prospective observer and encouraged to take up the work.

As the study of cloud formations is important in connection with the study of marine meteorology, I would suggest that a cloud sheet be issued for use with each book of forms 105. I have had several applications for this sheet; every record not of actual use should be excluded from reports of marine meteorology, and to make observers understand that the column "Form of clouds by symbols" means something, they should be helped to learn at least the correct names of the different cloud formations, if not their connection with the accompanying weather.

The number of "Greenwich Noon Reports" forwarded is much less than last year because most of them are now sent direct from the ships to the main office, and it has been the custom of this office to encou such direct communication rather than waiting for the ship-visitor in the office.

The time ball is dropped daily by this office, and during the past year has worked well. In its present location I know that the time ball is of very little direct benefit to shipmasters, and I again recommend that it be changed to a place visible from the harbor and lower wharves.

The chart agents here have been consulted with regard to any proposed changes in Hydrographic Office charts that would increase th usefulness or improve them in any way; they have no suggestions to offer, and all unite in saying that the charts as issued at present seem to be satisfactory to practical seamen.

In carrying on the work of the office I have always had the hearty assistance and good will of the various shipping firms, the Merchants' Exchange, and others interested, and to all these thanks are due for their co-operation.

The following is a tabulated statement of the work done:

	1889.						1890.						Total.
	July.	August	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Vessels visited	109	171	128	145	127	119	144	132	105	114	160	100	1,4[illegible]
Barometers compared	23	48	48	45	35	43	57	61	35	66	37	22	[illegible]
Pilot charts distributed	148	150	150	136	136	120	120	120	123	211	140	118	1
Hydrographic bulletins distributed	751	616	749	680	672	607	892	755	676	651	594	707	7
Hydrographic Office Notices to Mariners distributed	3,862	6,123	5,813	5,350	5,443	3,234	3,663	6,574	4,209	3,518	3,462	6,216	57,557
Coast Survey Notices to Mariners distributed	3,594	5,139	3,992	2,038	3,407	1,123	1,122	990	1,292	872	3,140	4,170	30,879
Light-lists distributed	13	20	24	11	6	22	20	40	11	10	13	19	209
Light-lists corrected				74	58	125	125				43		425
Day-marks corrected					65	63	88	130	55	19		55	475
Day-marks distributed	11	26	44	107	60	33	35	61	38	39	14	26	494
Weather reviews distributed	15	15	15	15	15	15	15	15	15	15	15	15	180
Life-saving books distributed			2					3	4	5	7	1	22
Notes on West India Hurricanes distributed	8							3	13	8	11	12	55
Notes on Use of Oil distributed										7	14	15	36
Variation charts distributed		1											1
Greenwich Noon Reports distributed (sets)	7	14	7	6	8	8	10	10	15	10	6	5	106
Gnomonic charts distributed	4		3	2	1				1		2		13
Meteorological journals forwarded				2									2
Reports:													
Greenwich Noon	9	8	22	8	31	8	16	13	13	9	7	8	
Storm	1	2	7	2	6	5	3	4	2	1	1	2	
Ice	2			1	1			6	5	9		6	

	1889.						1890.						Total.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Reports:													
Fog	5	7	4	1	4	....	....	2	2	5	2	3	35
Wreck	1	2	5	3	6	3	5	14	1	6	8	4	58
Current	....	....	....	....	....	....	....	1	....	....	....	1	2
Abstracts of logs forwarded	....	....	....	....	....	....	....	....	1	1	....	....	2
Buoys Adrift forwarded	1	....	1	....	2	1	....	....	1	1	....	....	7
Reports on Gulf Stream forwarded	....	....	....	....	....	....	4	12	5	....	....	....	21
Charts corrected for captains	....	....	4	2	3	2	....	2	1	....	1	....	15
Trade-wind reports	....	....	....	....	....	....	....	....	2	....	....	....	2

Respectfully submitted.

J. P. PARKER,
Lieutenant, U. S. Navy, in charge.

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE,
Norfolk, Va., June 30, 1890.

SIR: I have the honor to transmit herewith a report of the work done by this office for the year ending June 30, 1890.

This marks the first complete year of the establishment of a branced hygdrographic office at this place, and affords an opportunity of estimhting, to some extent, the amount of material that may be here gatherea or distributed.

On the 15th of August, 1889, Mr. Thomas Elliott, clerk and messenger, attached to this office, was discharged at his own request, and on September 4, Mr. Colin S. Craig was engaged in the same capacity.

It affords me pleasure to state that Mr. Craig has given satisfaction in the execution of the duties assigned to him. Being a graduate of the U. S. Naval Academy, there was no delay in his at once entering upon the duties of his position, which he has faithfully and intelligently performed.

During the season of cotton shipment many foreign vessels visit Norfolk, and these have generally been boarded.

Owing to the distance of Newport News and Lambert's Point (two places supplied from this office), it has not been expedient this year to visit all vessels that have entered these ports; but this office is constantly becoming better known and each month extends its usefulness.

Statistics show for the six months of 1890, shipment of coal from Lambert's Point at the rate of 104,000 tons per month, as against 85,000 tons per month in 1889 and 78,000 tons per month in 1888.

A great portion of this is supplied to foreign steamers which remain only a few hours in port.

Through the courtesy of Col. William Lamb, of this city, arrangements have been made by which I think that during the next fiscal year we will receive telephonic information of the arrival of all vessels at Lambert's Point for coal; thus enabling us to board them, no matter how short their stay in port.

In the distribution of hydrographic information at Newport News

I have been greatly assisted by Mr. James Haughton and by Mr. T. H. Gordon, of that city.

Mr. Gordon volunteered to become the agent for our office, assigning in his office a special place for the stowage of all received publications. As this is the principal marine supply store in Newport News the masters of sea-going vessels congregate here, and can readily get all of the latest printed hydrographic information.

Mr. Haughton has frequently informed me by telegraph of articles required by vessels whose stay in port was limited, thus enabling me to forward them by mail the charts or notices of latest date.

The major portion of the publications distributed by this office consist of that class (buoy books, light-list, etc.) which is of interest the coasting trade, which vessels, although commanded by Ameri citizens, can not give a corresponding return of maritime informa

The influence of the office may be seen in the increased sale of Hydrographic and Coast Survey charts since its establishment. Mr. B. A. Colonna, assistant in charge of the Coast Survey Office, informs me that he has observed that wherever a branch hydrographic office has been established the sale of the Coast Survey charts at that point has been doubled. Messrs. Vickery & Co., chart dealers here, inform that they have this year almost quadrupled the sales of last year. During the past year they note an increase of 50 per cent. each quarter over the sales of the preceding quarter.

There is no time-signal, of any kind displayed here. A time-ball, to be dropped at noon, is greatly desired by masters of vessels for the comparison of their chronometers.

In conclusion I would state that the commercial organizations of this city, as well as the several steam-ship and railway lines centering here, have been uniformly courteous to this office in furnishing all possible co-operation in the work of collecting and distributing data.

Work done by hydrographic office Norfolk, Va., year ending June 30, 1890.

	1889.						1890.						Total.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Reports forwarded:													
Storm	1		5	4	3			4	1				18
Trade-wind				1	2	1	1			2			7
Ice	1			1				2		2			6
Fog	2	1	2							1			[illegible]
Wreck			4	13	7	3	4	1	5	1	1	7	
Current							1	1					[illegible]
Shoal			1			1	1						3
Oil, use of						1			1				2
Buoys adrift	6		2	1	4	2		1	1		1		18
Whales sighted		13											13
Barometer charts forwarded				1									1
Greenwich noon reports forwarded			3	4				11			1	1	20
Vessels visited	33	6	14	15	16	13	40	13	26	20	20	28	244
Barometers compared	3		1		4		1	8	8	20			45
General information	760	133	85	52	152	116	135	78	149	67	114	157	1,998
Individual information	470	484	481	289	349	372	368	198	277	239	306	392	4,225
Charts corrected		46	7	21	35	57	39	19	8	10	36	37	315
(Distributed)													
Pilot Charts	125	121	184	148	183	175	125	121	119	116	114	120	1,651
Bulletins	258	346	294	374	314	263	290	262	268	252	307	286	3,514
Light-lists	13	16	22	15	33	45					19	29	192
Day-marks	23	17	3	6	76	66	78	37	53	65	45	89	558

Work done by hydrographic office, Norfolk, Va., etc.—Continued.

	1889.						1890.						Total.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
(Distributed)—Continued.													
Form 105 (sets)	....	1	3	5	7	7	4	3	3	1	....	....	34
Storm journals	12	6	15	7	15	18	9	10	2	1	3	....	98
Hydrographic Notices to mariners	1,161	3,407	1,969	1,814	5,644	4,479	3,356	1,929	2,997	2,088	2,429	3,344	34,617
Coast Survey Notices to mariners	1	137	....	51	1,365	2,992	960	1,001	1,253	985	445	1,178	10,368
Monthly weather reviews	10	10	10	10	10	10	10	10	10	10	10	10	120
Rules for use of oil	....	....	....	....	....	....	....	10	....	....	....	....	10
Ice blanks	....	....	....	....	....	....	....	....	2	1	2	1	6
Current blanks	....	....	....	....	....	....	....	....	18	....	....	....	18
Sailing Directions	....	....	....	....	....	....	3	....	....	....	....	3	2
Monograph No. 5	....	....	....	....	....	....	....	2	....	....	....	....	6
Day-marks Corrected	25	....	....	....	....	....	....	....	....	....	....	....	25

Respectfully submitted.

HENRY H. BARROLL,
Lieutenant U. S. Navy, in charge.

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE, U. S. NAVY,
Custom-house, Savannah, Ga., July 1, 1890.

SIR: I have the honor to submit the following report of the operations of this office for the fiscal year ending June 30, 1890.

This office was established August 1, 1889, by Ensign John S. Watters. On September 1, he was ordered to duty elsewhere and Mr. Clarence Hatch was left as assistant in charge.

Ample quarters were at first provided in the custom-house, a large room completely furnished being placed at the disposal of the office. Later on this room was taken for the use of a special agent of the Treasury Department, his headquarters having been transferred to this city. This office was given the use of a desk in the main office of the custom-house, while the charts, sailing directions, etc., were stored in various parts of the building. This was a very inconvenient arrangement and not much system could be followed or work done. On the request of the Hydrographer to the Treasury officials in Washington, permission was granted for the use of one of the small rooms in the basement of the custom-house occupied by the United States shipping commissioner.

In obedience to orders from the Navy Department, I assumed charge on November 15, 1889, and on the same day moved the office property into the new quarters, which we still occupy. These quarters are small, but in a good location, opening directly on the street, convenient for all maritime people and business men operating with the custom-house, ship agents, etc.

A larger and more pretentious office is desirable, but it seems about the best that can be obtained until the new public building is erected and the consequent removal of the United States courts thereto.

Since I assumed charge Mr. Hatch has continued in the service as ship visitor and clerk, to my satisfaction, and I take pleasure in r rting that his gentlemanly bearing and faithful performance of duty done much to add to the popularity and usefulness of the office.

No efforts have been spared to make the public acquainted with designs and workings of the office, more especially among those i ested in maritime affairs.

Masters of vessels are profuse in their acknowledgment of the sistance given them by the Hydrographic Office, and nearly a themselves of our offer of services, and before sailing call for a of the latest information.

It is not only by seamen that the services of the office are sought, but railroad officials, lumbermen, and all who are now and th fronted by a marine question in their business, readily seek the ai the office.

The commerce of this port is distinctly divided into three cl each of which has its particular season. These are carriers of cotton, of naval stores, and of lumber. The cotton carriers are mostly Eng steamers, English and German barks. The captains of these vessels are invariably intelligent and appreciate the work accomplished by the Hydrographic Office. They are nearly all willing to assist in the lection of data and this office is largely dependent upon this class for voluntary observations and special reports. The season for cotton exportation extends from about October 15 to March 1.

The carrying of naval stores is confined to North Country and Ital barks, bound for Europe; they come in ballast from the east co South America and are usually delayed at quarantine for some t This class of navigators has been found of little use in collecting information, though a few fair observers have been obtained. They generally deficient in the English language and have not the int gence to take the observations properly, even if they had the nece instruments which few seem to have. I have furnished many of th with careful instructions in regard to keeping Form 105, but with lit result. These people fully appreciate all the information the office will give them and are not backward in availing themselves of our servi This trade lasts well into the summer.

The lumber trade is nearly all domestic and is carried on by coa schooners. Few vessels have cleared with lumber for foreign po that trade seeming to go to Brunswick, Darien, Port Royal, and smaller ports. The American schooners have been of much assistance in reporting wrecks, currents, fogs, etc. Few of them, however, have facilities or inclination to become voluntary observers. A few of t better class have taken the observations for this office, but even th are greatly lacking in results. They all acknowledge the utility of the office and readily accept all that can be done for them, but many se to think our efforts are more applicable to deep-water ships.

Savannah has few imports, and when the season for the staple products of this section is over, commerce becomes very slack.

A table indicating the arrivals each month is appended marked A. In relation to this table I would state that thirty-two of the steamers reported each month are American coasters forming the regular lines to Boston, New York, and Baltimore. The schooners reported each month are also American coasters carrying lumber. The remaining vessels are nearly all foreign. As before mentioned nearly all come from the South Atlantic in ballast and take cargo for European ports, so that the facilities of this office for collecting information, except in the best-known tracks of commerce are few.

Another difficulty encountered is the strict quarantine regulations applied at the mouth of the river, by the city, to all vessels from ports in South America and West Indies. Sometimes they are detained for three weeks and by the time this office can reach them, their information is old, besides being obtained with difficulty. Many vessels arrive at Tybee from abroad there to await orders and go thence to various ports south of Hatteras. At present all information from these vessels is lost owing to lack of facilities for boarding them in the open roadstead; but I trust that next year I shall be able to make some arrangements by which some of them, at least, will be saved to us. Nearly all the vessels which have come into this port the past year have been boarded and the courtesies of the office extended with the usual offer of services. These have been generally accepted and the custom has grown up among the shipping agents of bringing the captains of vessels to the office to receive the latest information we may have on hand.

When a particularly careful and intelligent observer has been obtained, I have endeavored to retain his services for the office by means of a continuous correspondence and efforts to keep him supplied with the most important information, no matter in what part of the world he may be. This is rendered necessary by the character of the commerce of this port, if any showing of the work done is to be made.

There are no regular lines of steamers in the foreign trade coming to this port, and it is very seldom the same vessel comes here twice in the same year. I find, too, that captains take more interest in their work if they can depend on any one branch office for the results of their labor as voluntary observers. Many of them have been fitted out with the forms, and after taking the observations for one voyage their interest lags and their observations cease. The next voyage is probably to some other country, and it may be a year before they again come in contact with a branch office. All this time their services are lost to the office, while they are perfectly willing to observe if they could see immediate benefits arising from it.

The routine work of this office has been carried out in keeping the sailing directions and light lists corrected to date from the notices to mariners. Efforts have been made to keep the light lists and buoy books of the light-house department, which are given to vessels, corrected to date with fair success. The correction of charts has not flourished, owing to lack of space and no table on which a chart can be spread. With next year's funds I hope to supply this deficiency.

The sale of American charts has been greatly increased in this section since the establishment of the office. The agent here reports that he has sold fully three time as many as he did before. I find that our charts are greatly preferred to those of foreign make, and much work has been done in assisting captains to make their selections of charts. Many charts are called for which the Hydrographic Office does not yet publish, and assistance has been given them in securing the admiralty charts in New York. The largest demand there for these seems to be of the north and west coasts of Spain and Portugal, with plans of the principal ports on the same sheet.

Some difficulty is experienced in obtaining nautical almanacs. The demand for these books is uncertain; sometimes it is quite large and then again small, but the chart agents are obliged to lay in a certain number and pay for them in advance. On account of the uncertainty of disposing of the whole stock and consequent loss to them, few are willing to do this, so nautical almanacs are impossible to secure on short notice. It has been suggested that they be put on the sa ing as other nautical publications and returns made after the bo sold.

Praise for the usefulness and general correctness of the N. A. chart is constantly coming in, and its popularity, together with tha the weekly supplement, is steadily increasing. It is hoped that small number (25) now allowed this office will be increased in the ing year, so that I can supply the regular observers and parties ested in shipping matters. They are the best advertisement the can have, and when intelligent captains can be supplied with th goes far to aid us in gathering information. In the busy season, October to April, this office should be supplied with at least 75.

The Hydrographic Office's forecast of the weather at sea, and o information taken from the advance sheets of the Pilot Chart, is lished each month by the leading newspapers in Wilmington, N. Charleston, S. C., Savannah and Brunswick, Ga. By this means most important information is widely distributed along the coast. Brunswick Times devotes nearly a column in each issue to wrecks dangerous obstructions along the coast. This is kept corrected to from the Pilot Chart and weekly supplement. The Savannah Mor News has kept standing, free of charge, since the office began, the lowing notices to mariners.

NOTICE TO MARINERS.

A branch of the United States Hydrographic Office has been established in the cu tom-house at Savannah. Notices to mariners, pilot charts, and all nautical info tion will be furnished masters of vessels free of charge. Captains are requeste call at the office.

F. H. SHERMAN,
Lieutenant in charge of Hydrographic Statio

As this paper has a large circulation among the business men al the coast, the notice has done much to advertise the office, and the r has been numerous letters and applications from people remotely lo- cated have been received. The co-operation of the Signal Service servers at Wilmington and Charleston has not been of as much servic as was desired, though these offices are useful in the distribution notices to mariners and other publications. The observer at Wilmington seems to do all he can, but of late his time is so taken up by creased duties in his own office that he has been unable to attend to hydrographic work. During the winter he furnished considerable information, compared quite a number of barometers, and secured some excellent voluntary observers.

The observer at Charleston has done very little for this office. I derstand his time is completely occupied.

I respectfully call attention to the importance of establishing a sub-office at Brunswick. This city is rapidly growing in size and assuming considerable commercial importance as an outlet for the staple products of Georgia. Already the terminus of two important railroads bring in for export the products of the interior; others are heading in that direction, and all tend to increase its maritime importance. The Government is improving the harbor, which already has the advantage of being much easier of access than this. There is no Government building there, the custom house being rented and rather cramped for room, but the collector is obliging, and no doubt a desk could be obtained there which would be ample room for collecting and giving our informa-

n. A boy could be hired for a reasonable price and the business run rom this office. If this were kept up only from October to April, I think he office would be greatly benefited.

Much satisfaction is expressed at the work of the U. S. S. *Despatch* n destroying wrecks along the coast, and it is greatly regretted by the en whose lives and property are in constant peril from these dangers the Government does not fit out a vessel for the express purpose pursuing this work in a systematic manner. From the fact that uch a large portion of the vessels that carry the American flag are sters, it would seem that the protection of American commerce would best served by the Government in keeping the channel clear of nken dangers.

It has occurred to many that as the revenue-marine vessels are supposed to be constantly patrolling the coast, the duty of keeping the mmediate coast clear naturally devolves upon them. With very little ditional time and expense much could be done in this way, and it is matter of wonder that it is not required of them. They are as well itted for the work as the *Despatch*, and a few pounds of dynamite udiciously applied is often all that is required. The sunken wrecks e considered even more of a nuisance than the derelicts as so little of em is exposed; steamers dread them because of the danger of entanging the screws in the floating rigging.

The desire is often heard among coasting captains that, pending the onstruction of a light-house on the extremity of Cape Hatteras shoal, ething be placed to mark it temporarily. The currents are uncerain, and in foggy and misty weather the lack of some mark is much elt.

In conclusion I wish to extend the thanks of the office to the collector nd other officials of the custom-house for the universal courtesy and any favors shown us.

To the press of this city and the shipping agents, I am greatly indebted for the aid they have continuously rendered.

The following table presents in detail the work done for the year.

Arrivals in port.

	1889.		1890.					
	November.	December.	January.	February.	March.	April.	May.	June.
Steam-ships	60	40	40	35	36	36	34	31
Ships	......	1	1	......	......	......	......	......
Barks	16	21	22	31	27	18	16	13
Brigs	2	5	2	1	1	2	1	1
Schooners	27	33	34	32	24	22	27	18
Total	95	100	99	99	88	78	78	63

Arrivals in port—Continued.

	1889.			1890.					
	October.	November.	December.	January.	February.	March.	April.	May.	June.
Information forwarded.									
Reports:									
Trade-wind	......	......	2	20	20	16	13	8	6
Ice	2	......	......	......	......	2	......	8	......
Wreck	......	10	8	9	9	17	5	3	8
Fog	......	......	3	9	2	3	1	9	2
Storm	3	12	10	2	13	8	11	5	2
Use of oil in storms	......	3	......	2	1	......	1	......	......
Current	......	......	4	6	2	3	......	......	......
Meteor	......	......	......	......	......	......	......	1	......
Water-spout	......	......	......	1	1	3	4	2	1
Gulf stream temperature	......	......	......	3	4	2	......	......	1
General information	......	......	......	2	1	2	......	1	3
Articles distributed.									
Pilot charts	58	20	25	25	25	25	26	25	25
Weekly supplements	154	72	86	113	117	111	84	141	144
Notices to mariners	510	2,016	1,904	3,801	2,388	2,703	1,696	1,534	2,433
Coast Survey notices to mariners	36	34	21	23	14	14	32	18	42
Light lists	44	42	17	12	25	20	8	6	9
Buoy and beacon lists	......	5	4	36	38	34	35	22	18
List of merchant vessels	......	......	......	......	......	3	......	1	......
Nautical monograph No. 5	......	2	2	1	......	3	1	2	1
West India hurricanes	......	......	......	......	......	31	7	8	6
Use of oil	......	......	......	......	......	25	6	5	4
Monthly weather reviews	13	......	4	6	9	11	4	4	7
International conference	......	......	......	......	......	......	......	......	......
Work done.									
Vessels visited	46	102	101	112	58	52	58	45	42
Information furnished to individuals	143	109	116	183	148	151	130	101	84
General information furnished	2	6	7	6	8	9	6	6	6
Barometers compared	50	108	42	56	18	4	10	2	6
Thermometers compared	......	14	19	9	7	2	4	......	......
Office charts corrected	......	......	......	2	1	8	2	......	......
Vessels' charts corrected	......	......	2	......	......	......	1	1	......
Office light lists corrected	......	......	18	53	45	12	8	6	......
Vessels' light lists corrected	......	......	2	......	......	2	......	1	......
Buoy books corrected	......	......	......	12	30	23	4	4	6

Respectfully submitted.

FRANCIS H. SHERMAN,
Lieutenant, U. S. Navy, in charg

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE,
New Orleans, La., July 7, 18

SIR: In obedience to your instructions, I have the honor to the report of the work accomplished at this office during the fiscai y ending June 30, 1890.

Between July 1 and October 1, 1889, the office was in charge of assistant, I being absent on duty. Very little can be accomplished ing that period, as the commerce of this port is almost entirely confi to the rest of the year, beginning with and practically ending with cotton trade.

During the past year I have endeavored to systematize the supplying information to masters of vessels, and besides having erably increased the issue of Notices to Mariners over that of last year, feel that it has been much more effective than ever before. I have had nstructed two large frames containing pigeon-holes, labeled with the names of the vessels from which information is received, and including l American vessels. In this way I can with very little trouble be sure ta every vessel receives every notice affecting her route. Whenever ve ls are within reach of the United States mails, whatever has come during her absence is mailed to her, and a new set starts at once with the next arrival of notices.

Although a number of new observers have been secured, some of those formerly keeping the observations have, greatly to my regret, disntinued them. This is partly due to the frequent change in comands among the regular liners, which has been particularly noticeable this year, and also probably to the fact that observations are now mailed direct to Washington instead of passing through the branch office. This change was instituted at about the beginning of the year just past with a view to the saving of time in getting the reports to Washington, as reports coming from abroad were sent to this office by way of New York, and consequently involved at least four days' loss of time to get them back to Washington.

I would recommend that form No. 104 be discontinued for this office, and that the supplies for the Signal Service observers from Key West to Brownsville be sent here and be sent out from this office.

This would make this office a center for all information received and sent out from the Gulf coast, and the increase of its scope would correspondingly increase the scope of the Hydrographic Office. The officer in charge should also visit once or twice a year places of importance along the Gulf, with a view to interesting the maritime communities in the work of the office, calling upon the chart agents, and pointing out to them the importance of keeping the charts and other publications of the office, and also interviewing the Signal Service observers, who, although they have but little time to spare, can perhaps be encouraged by a personal visit.

The reduction in the number of Pilot Charts sent me has been a great drawback and source of regret, both to myself and to the masters and officers of vessels. I have had requests from captains for Pilot Charts for the use of their officers and from the officers themselves, which I have been compelled to refuse, the number sent to the office having proven inadequate in the busy season to supply even one to each ship. Numbers of vessels have thus been deprived of them.

The Pilot Chart is coming to be more and more appreciated, and expressions of commendations of the work of the Hydrographic Office are heard on all sides. The prompt re-issue of corrected Coast Survey charts has kept the office well supplied, without the necessity of doing any correcting in the office. The number of hydrographic charts has increased to such an extent that the shelves in the office have become too full for convenience, and I would like to have more made to accommodate them. Another book-case is also needed, as the one in the office is too small for the number of books on hand.

Owing to delay in the post-office delivery and to the shifting of berths, vessels have failed to receive the supplies mailed to them; and I would, therefore, recommend the employment of a porter to bring packages from the post-office too large to be distributed by the carriers, and to distribute packages to vessels from the office. The expense would not be greater than $20 or $25 per month.

The time ball recently put in working order is now being dropped every day at 11 o'clock, except when signals are not received. This ha frequently been the case of late, owing to local operators cutting o the loop in which the relay in the office is, or to local telegraphi during the three minutes before 75th meridian noon.

The location of the time-ball is bad, as it can not be seen from th vessels along the levees except by going aloft.

It has been found that coasting vessels and those plying between and Central American ports, will, with few exceptions, not take u observations. I attribute this in part to the smaller number of offic they carry, and in part to the short periods of time they are at sea, t interruptions thus being very frequent.

In general the work of this office shows considerable improvem over last year, which is very gratifying to me. I hope to be able make even a better showing next year, and earnestly hope that in t matter of pilot charts it will be found possible to increase my allo ance considerably. As this is, in the eyes of captains, the most i portant thing given out by the office, it is a pity that its issue has b curtailed owing to the lack of a few thousand dollars.

I would recommend the resumption of the issue of psychrometers an incentive to take observations. Few vessels are provided with important instrument, and the supplying of it by the Hydrog Office was much appreciated by those who got them. As the nu was very limited the effect was perhaps adverse on those who di get any.

The thanks of the office are due the Maritime Association for th uniform courtesy and the use of their rooms, also to the press, the changes, and the various shipping firms and agents, who have forward in every way the work of the office.

Tabulated statement of work done.

	1889.						1890.					
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.
Vessels visited	....	....	17	46	73	50	58	37	52	22	24	13
Barometers compared or adjusted	....	....	22	55	91	68	80	53	70	30	38	20
Information to individuals	57	76	47	82	94	79	58	76	96	71	79	63
Chronometers comparisons given	....	....	....	....	5	11	3	4	3	1	4	....
Pilot Charts issued	79	80	74	75	112	45	63	72	71	43	48	52
Weekly supplements to Pilot Chart	500	511	502	534	322	91	69	104	126	44	69	70
Day marks, United States, issued	5	9	7	86	249	190	9	44	123	146	113	112
Light-lists, United States, issued	4	3	3	22	50	6	....	....	....	....	26	3
Extract notices to mariners	5,399	6,821	10,879	5,847	5,351	6,133	5,492	7,455	4,438	7,389	4,290	3,407
West Indian hurricane charts	....	....	....	....	....	....	....	11	34	....	....	....
Use of oil issued	....	....	....	....	....	....	....	2	35	13	....	....
Wrecks (including wreckage)	1	3	....	2	2	....	2	....	1	1	2	1
Storms at sea	4	....	....	4	7	....	2	....	4	....	2	....
Buoys adrift	....	....	....	1	....	....	....	....	....	....	2	....
Bell buoy adrift	....	....	1	....	....	....	....	....	....	....	....	....
Water spout report	....	1	....	....	....	....	....	....	....	....	....	....
Trade-wind limits	2	....	1	....	....	....	....	....	....	....	....	....
Current report	....	....	....	....	....	....	1	....	....	....	....	....
Greenwich noon reports distributed	2	3	2	25	87	53	16	43	76	6	29	20
Greenwich noon reports forwarded	15	17	25	27	22	15	20	21	28	13	19	12

Tabulated statement of work done—Continued.

	1889.						1890.						
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
ct log British steamship *teeman*			1										1
act log American schooner *Comet*				1									1
tract log American schooner *Rollin Sandford*			1										1
Monthly weather reviews	2	4	2		49	28	33	37	31	28	35	24	273
Annual summary monthly weather review											29	5	34
Supplement to October chart				58	21								70
Fog report	5	1			3							4	13
Ice report	1	1		1							2		5
Whale report		2											2
Coast Survey notices to mariners	3								19	360	414	960	1,761
Pilot charts sold	2	1											3
Vessel on fire at sea							1						1
Bottle papers picked up and forwarded								1					1
Chart of Guanta Harbor, Venezuela, drawn by second officer steamship *Haytian*								1					1
Chart of Carenero, Venezuela, drawn by captain steamship *Nantes*									1				1
Circular relating to Port of Cabedello, Brazil											1		1
Report of flood, Mississippi River									2	2			4

Respectfully submitted.

JOHN S. WATTERS,
Ensign U. S. Navy, in charge.

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE,
Merchants' Exchange, San Francisco, Cal., June 30, 1890.

SIR: Referring to your No. 2117, I have the honor to submit the following report of the work done by the San Francisco branch of the United States Hydrographic Office for the year ending June 30, 1890:

Following the course marked out in my report of last year, no efforts have been spared to increase the prestige and popularity of the Hydrographic Office, and to give it a solid standing with the maritime and insurance interests of the Pacific coast.

It is with some gratification that I have to report that this branch has already assumed a position of importance to the general public, and is rapidly becoming a necessity to the maritime community. Information on a great variety of subjects is constantly sought for at our hands, and no matter what may be the inquiry, it has been and is our custom never to turn away an applicant if the means of affording the desired information are at our disposal or within our reach.

Shipping firms and people apply to us for all the latest nautical information, and agents of marine insurance companies consult our files and records for information concerning risks that they are asked to take. We have even been applied to by country builders for information concerning the sun's declination and for other data with a vie the location, orientation, and arrangement of buildings so as to o upon their windows the greatest amount of sunlight through year.

It is greatly to be regretted that so far Congress has not seen provide more liberally for the support of the branch offices. We a continually hampered in our work by the smallness of our appro tions. In whatever direction we turn we meet with work entir within our province, that can and that ought to be done, but that can not undertake for lack of funds to meet the necessary expenses.

Taking out the amount paid in salaries to assistants, this office h had but $230 with which to meet the current expenses of the during the past year. These include the keeping in order of the ti ball apparatus and the time-ball batteries, three in number, the repa to over a mile of telegraph line between this office and Telegraph H where the time-ball is located, the repairs to instruments and furnitu the purchase of stationery, and the expense attending the issuing special bulletins, the payment of foreign postage, and the car-fare a ferriage of assistants engaged in the collection of data from the merch marine and in comparing the barometers of merchant vessels.

With the above sum, already manifestly inadequate, we are impe in our advance into new fields of usefulness that are entirely in the l of our work and that lie, moreover, close at hand.

During the past year considerable additional work has been done l ing toward the early publication of a monthly pilot chart of the P Ocean. This is a work which especially commends itself to all who in any way connected with or interested in the shipping interests the Pacific coast. Resolutions calling for appropriations for this w have been adopted by all the principal maritime and commercial b of the coast. It is earnestly hoped by all concerned that Cong will, at an early date, see fit to provide for the prosecution of this portant work.

The special bulletins issued by this office have been received w universal favor by the commercial, shipping, and insurance commu ties of the Pacific coast. Many applications to be regularly supp with them have come from all quarters, particularly from persons re ing in the Pacific islands. Owing to lack of funds, however, we h been unable to issue more than four bulletins since the 1st of July l

The reports of Lieut. Commander C. H. Stockton, U. S. Navy, c manding the U. S. S. *Thetis*, and of other officers acting under his rection, concerning the waters of the Arctic and the Bering Sea, very highly appreciated. Copies of these reports have been placed board of every vessel leaving this port for those waters.

In the collection of meteorological data from the merchant mar we find great difficulty in persuading masters of vessels to keep f 105, issued by the office, for the reason that the taking of the obse tions required at the time specified (Greenwich noon), necessitates th turning out in the middle of the night.

Masters of vessels say that they can not trust their officers to t the proper observations at the proper time, and that a personal su vision of the matter would be attended by great inconvenience to th If similar forms were issued, for use in the Pacific only, requiring observations to be taken at some other time, say Greenwich midni I am sure that we would be able greatly to increase the number of uable observers.

Another obstacle in the way of our obtaining full and complete ports from observers is the lack of proper instruments for obtaining meteorological data. A few masters of vessels who are greatly interested in the work of the Hydrographic Office have purchased the necessary instruments for themselves; the great majority are unwilling to do this. When the collection of simultaneous observations was in the hands of the United States Signal Service their observers were supplied with instruments; so, at least, I have been informed. When the work was turned over to the Hydrographic Office, the Signal Office of course withdrew its instruments, and the result was that the great majority of observers ceased taking the observations. The time-ball under the management of this office has worked very satisfactorily during the past year, but few failures being recorded, and these were principally due to the defects in the cable across Mare Island Strait. The Gardner clock in this office has worked without a single failure and is daily consulted by the business community of the city for the correct time. If similar time service were established at Port Townsend, Portland, and San Diego, or San Pedro, the benefits derived therefrom would be very great.

I would also renew my recommendation of last year touching the establishment of branch offices at Port Townsend and San Pedro or San Diego.

The Hydrographic Office is to be congratulated upon its recent issue of charts of ports and harbors on the coasts of Chili and Peru. These charts are highly commended, as are also the charts embodying the recent surveys of the U. S. S. *Ranger* on the coast of Lower California.

Inquiries multiply for charts of the coasts of China, Australia, and the East Indies. Hydrographic Office charts No. 1170, the western part of Java Sea and the Southern Passage to China, and No. 1188, Batavia Roads, are highly appreciated.

Vast regions of the Pacific Ocean are practically unexplored. The charts of the South Pacific and of the western portion of the North Pacific are dotted with reported dangers, the location and in many cases the existence of which are undetermined. Many of the dangers and islands known to exist are erroneously located and their extent incorrectly laid down. It would seem a wise course to broaden the surveying operations of the office to the extent of keeping two or three vessels constantly employed in surveying among the islands of the Pacific, under the immediate direction of the Hydrographic Office. If this were done the results would certainly demonstrate the wisdom of such a course. The harvest is great, there are laborers not a few, there are not wanting also, certain of the appliances necessary for the work, and all that is lacking is authority to proceed, coupled with sufficient appropriations to defray the necessary expenses.

Further attempts have been made to interest missionaries and others residing in the islands of the Pacific in the work of the office. Owing, however, to the lack of mail facilities these efforts have not so far been crowned with the success that could be desired for them. Lieut. John Downes, U. S. Navy, navigating officer of the U. S. S. *Thetis*, has kindly offered to take charge of a number of sets of form 105 for distribution among people in the islands who are willing to keep them.

In conclusion, I desire again to refer to and in the strongest manner possible to emphasize the fact that the quarters allotted to this office are altogether inadequate. We can do no manner of fine or accurate work here, owing to the continued noise and dust. We have also no further room to stow the constantly increasing number of charts and books. The renting of suitable quarters is imperative.

Following is a tabular statement of the work of the office for the year:

	1889.						1890.						
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Reports:													
Storm	7	3		3	5			2	2			1	
Trade-wind	23	30	10	32	14	28	20	22	21	12	5	15	
Ice								1					
Fog	1												
Waterspout		1		1					1	1		1	
Earthquake		1								1	1		
Wreck (including wreckage) and logs	1			1	1	1		2	2			1	
Current	3	3	1			3	1		1	1	1	1	
Buoys adrift	6		1		1						1		
Vessels visited	54	99	46	74	95	48	46	41	69	43	49	47	
Barometers compared or adjusted	13	15	6	13	7	8	10	9	20	10	22	38	
Chronometers rated	2	17	11	2	2				6	4	2		
General information	194	325	123	90	100	100	70	120	148	90	154	88	1,6
Information given to individuals	543	804	557	534	675	562	507	558	770	583	667	557	7,1
Light-lists distributed	9	11	6	11	9	9	6	4	6	5	7	21	
Greenwich noon reports forwarded	28	21	18	15	28	22	19	22	18	18	17	17	
Greenwich noon reports distributed (sets)		6		8	2	2	3	7	2	4	9	44	
Day-marks distributed	14	22	13	25	20	18	11	10	16	7	14	41	
Charts corrected	27	18	4	5					3		4		
Charts distributed	12	10	6	1		17	3		4		1	7	
Vessels' tracks forwarded	2	1											
Chart corrections forwarded	1	1	3		3						1	1	
Meteorological journals forwarded				2	1				1		4	1	
Meteorological journals distributed				1								1	
Pilot Charts distributed	16	16	30	16	15	17	3	20	16	7	17	20	
Supplements to Pilot Charts distributed	8	10	2	4	14	8	4	10	10	8	10	8	
Notices to Mariners distributed	2,716	4,129	816	2,426	1,777	1,692	2,812	2,667	2,798	3,230	2,276	1,323	27,
Coast Survey Notices to Mariners distributed	40	55	40	30	10	70		50	150	21	45	50	
Monthly Weather Reviews distributed	6	6	5	6			6	5	6	6		6	
Abstract Logs forwarded	2	2	2	3	2	2		1	2	1			
Meteorological Reports forwarded	9	5		5	6	1	9	3	11			6	
Pamphlets on "Use of Oil" distributed		1					1		25		1	1	
Ice and Ice Movements in Arctic Sea distributed								34	22	2	3		
Reports on dangers in Pacific forwarded					1	1							
Reports of the Hydrographer distributed						11							
Publications on West Indian Hurricanes distributed									26				
Tidal Wave Reports forwarded									1				
Cable Charts distributed										1	2		
Reports on "use of oil" forwarded	1			1	1					1			
Special Bulletins distributed		500	1	500	500		1	500					2,
Light-House Notices forwarded	1		1	2	7	3		2					

Respectfully submitted.

H. P. McINTOSH,
Lieutenant, U. S. Navy, in charge.

The HYDROGRAPHER.

BRANCH HYDROGRAPHIC OFFICE,
Portland, Oregon, June 30, 1890.

SIR: In obedience to your instructions, I have the honor to submit the following report of the operations of the Portland branch of the United States Hydrographic Office for the fiscal year ending June 30, 1890.

The regular routine work, consisting of correcting charts, light-lists, and sailing directions, distributing all kinds of nautical information, collecting and forwarding reports on nautical matters, visiting vessels, etc., has been carefully performed.

No effort has been spared to disseminate knowledge of the existence and purpose of the Hydrographic Office, and to establish cordial relations between this office and masters, ship agents, and brokers and agents of the Hydrographic Office in ports of Oregon, Washington, and Alaska.

As a result of these efforts I am pleased to be able to report that this office promises to occupy that position among all interested in navigation which has resulted from the well-directed administration of the other branch offices in the east and in San Francisco.

The efficiency and popularity of the branch offices on this coast will be largely increased by the publication of a pilot chart of the Pacific Ocean. Many masters, now unwilling to devote the time to keeping logs for the office, will be induced to turn their attention to this matter when the result of their work can be promptly placed before them in a pilot chart.

There has been much interest manifested in the proceedings of the International Marine Conference and the pamphlets received have been highly appreciated. Attention has been directed, in a forcible manner, to the necessity of local and international sailing rules agreeing, by the sinking of the British ship *Clan MacKenzie* while at anchor in the Columbia River by the steamer *Oregon*, the anchored ship being held at fault for not showing a flare-up light to the approaching steamer.

I would repeat the recommendation contained in my last report concerning the establishment of a branch office at Port Townsend, the port of entry for the Puget Sound custom district, where all the large ocean commerce of the entire sound must pass. An idea of the number of vessels which could be reached from this office may be formed by considering the fact that the entrances and clearances from this port are exceeded in but three other ports of the United States. While information has been distributed to the majority of these ships by this office, it has been found that a personal interview with masters is always more successful than correspondence in securing co-operation in the matter of reports.

The establishment of a time-signal would be of great assistance in extending the usefulness of this office, and of great benefit to commerce. This, I consider, a most urgent need, if this office is to be made a necessity to the shipping community.

The special bulletin of the San Francisco office has been received with much favor and offers an excellent means of keeping the office before the business community. It is to be regretted that it can not be regularly issued.

This office was removed in March to the new location of the Merchants' Exchange Association, where, through the courtesy of the secretary, we have been allowed, rent free, space sufficient to carry on the work for the present. This, however, is a temporary arrangement, and it is to be hoped that quarters may be obtained in the new custom-l upon its completion.

It has not been possible to devote the time desired to mingling those interested in shipping. It has been my wish to have as few a possible applying for information during office hours, to find tl closed.

Routine office work has occupied the greater portion of my t leaving outside work to be done before and after office hours.

For the proper prosecution of work an assistant should be allowed.

It is a pleasing duty to acknowledge the many courtesies extended to the office by the Merchants' Exchange Association, shipping agents, H. O. agents, and in fact by all with whom the duties of the office hav brought me in contact.

Very respectfully, your obedient servant,

D. F. TERRELL,
Ensign, U. S. Navy, in charge.

The HYDROGRAPHER.

DIVISION OF CHART CONSTRUCTION,
Hydrographic Office, July 1, 1890.

SIR: In this report I have the honor to set forth accounts of the forc employed and its distribution; the work done in making and pub ing new charts and in correcting and preserving those on issue; investigations which have been made into the subjects of deep-sea so ings, terrestrial magnetism, and geographic positions to facilitate current work on charts, and the changes made in the methods of rying on the work.

THE FORCE EMPLOYED.

Throughout the year six draughtsmen have been engaged in prep new charts for publication and in revising and correcting cl rs on issue before printing; one draughtsman, in receiving and recording information and in charging it to the publications and geographic secti affected, and in the revision of new engraving; and one draughtsman, in compiling deep-sea sounding sheets; one computer has been en in compiling and computing data relating to terrestrial magnetism, in computing and laying down the projections for new charts; elev engravers and five engraver's apprentices have been engaged in engraving new charts, and in engraving corrections on charts on issue; record-clerk has been engaged in keeping the time of the employés in compiling the records of construction and correction of charts; thr printers and one printer's apprentice, and two laborers have been eng in printing charts for issue; and four laborers have been employ respectively as custodian of information, messenger, night-watchman, and plate maker. For a part of the year one draughtsman, who was to re-enforce the division of chart supply, was engaged in prepari charts for engraving, and two engravers, who resigned their sitions, were engaged in engraving new charts.

A comparison of this statement with those in the reports for 1888 1889 will show that the force has been diminished by two eng and one draughtsman, and increased by one engraver's apprentice one laborer during the past year, and that it has been diminished by engravers and one draughtsman, and increased by two engraver's app tices during the past two years. Although the increasing skillful of the engraver's apprentices has in some measure made up for t it should be clearly stated that unless provision is made to keep up the force the plans for the future advancement to new ground will be largely defeated. There are now 571 plates to be kept correct for the issue of charts. There were 441 in 1888. To sustain in due efficiency so large a number of charts necessarily requires a considerable portion of the funds allotted for chart making. Many of the plates are old and require reconstruction, while the constant receipt of information renders perpetual correction necessary to all of them. In order to secure a uniform rate of progress in the construction of new charts a gradual increase of the force is necessary.

GENERAL COAST CHARTS.

The series of general coast charts of the United States has been extended by the completion of a chart on a scale of 4½ inches to the degree of longitude covering the Gulf coast from the mouths of the Mississippi to the mouth of the Rio Grande. And the general system, on this scale, has been extended by the completion of six charts of the west coast of South America, covering, respectively, the coast between Panama and Cape San Francisco, Cape San Francisco and Paita, Paita and Pisco, Pisco and Arica, Arica and Caldera, and Caldera and Valparaiso. There are now in course of construction charts of this scale covering the Madeira and Canary Islands with the adjacent coast of Africa, the coasts of Japan from the strait of Tsugar to Yokohama, and from Yokohama to the island of Sikok, and the strait of Corea with the adjacent coasts of Corea and Japan. The series of general coast charts, on a scale of 2.7 inches to the degree of longitude, covering the region from the strait of Sunda to Hong-Kong has been finished; and the chart of Bering Sea and the Arctic Ocean, on a scale of 0.65 of an inch to the degree of longitude, has been extended by the completion of a supplement on the same scale, embracing the coast from Point Barrow to the Mackenzie River.

SPECIAL COAST CHARTS.

This system of charts, on a scale of one-fourth of an inch to the minute of middle latitude, has been extended up the river St. Lawrence to Quebec, and considerable progress has been made upon the two remaining charts which will make up the series enveloping Newfoundland.

The second of the series of special coast charts, from San Quentin Bay to Cerros Island, resulting from the survey of the U. S. S. *Ranger* on the coast of Lower California, has been published, and the third is drawn as far as San Bartolomé Bay.

Charts upon this scale, of the east coast of the Argentine Republic from Bahia Blanca to Rio Negro, and of the east coast of Central America embracing the Gulf of Honduras and approaches, have been published.

SPECIAL CHARTS.

Charts of this system, on an average scale of 1 inch to the minute of middle latitude, covering special localities, have been published for the Tagus River and Lisbon, Portugal; Bahia Blanca, Argentine Republic; the Demerara and Essequimbo Rivers, Guiana; Miramichi Bay, New Brunswick; the approaches to Batavia, Java; the approaches to Coronel and Lota, Chili, and Singapore and Rhio Straits, East India Archipelago.

HARBOR CHARTS.

The work upon the plans of harbors, on large scales, as well as the work upon the more general charts, and also upon miscellaneous plates, is set forth in detail in the following tables:

Charts engraved on copper, and published during the fiscal year ending June 30, 1890.

General locality.	Catalogue number.	Title.	Scale.		Size	When begun.	When finished.
Canada	1111	River St. Lawrence, Point de Monts to River Saguenay	D. lat.	$=14.\frac{13}{16}$	23 x 27	May, 1888	July, 1889
Chili	1160	Guanillo del Norte	M.	= 4.0	11 x 13	June, 1889	July, 1889
West Indies	1161	Kingstown, Great Head, and Calliaqua Bays, St. Vincent Island	M.	= 4.0	17 x 21	Apr., 1889	July, 1889
United States	1126	Gulf Coast of the United States, mouths of the Mississippi to mouth of the Rio Grande	D. long.	= 4.5	32 x 43.1	June, 1888	Aug., 1889
Peru	1162	Ferrol Bay	M.	= 2.0	16 x 16.5	July, 1889	Aug., 1889
Brazil	1163	Ceara Bay	M.	= 4.0	17.5 x 22.5	June, 1889	Aug., 1889
Hawaiian Islands	1164	Makena Landing, Maui Island	M.	= 4.0	6.0 x 8.3	June, 1889	Aug., 1889
		Nawiliwili Harbor, Kauai Island	M.	= 4.0	9.0 x 8.3		
		Kailua Bay, Hawaii Islands	M.	= 4.0	5.2 x 8.3		
		Kealakekua Bay, Hawaii Island	M.	= 4.0	5.2 x 7.3		
		Kahului Harbor, Maui Island	M.	= 4.0	9.0 x 7.3		
		Kawaihae Harbor, Hawaii Island	M.	= 4.0	6.0 x 7.3		
Canada	1112	River St. Lawrence, River Saguenay to Quebec	D. lat.	= 14.7	22.5 x 27.8	Nov., 1887	Sept., 1889
West Indies	1165	Port Castries, St. Lucia Island	M.	= 15.2	21.6 x 21.7	Mar., 1889	Sept., 1889
Gulf of St. Lawrence	1167	Gaspé Harbor	M.	= 1.5	11.0 x 11.0	Aug., 1889	Sept., 1889
West Indies	1166	Marigot Harbor and Grand Cul de Sac Bay, St Lucia Island	M. M.	= 8.0 = 14.0	16.5 x 16.5	Aug., 1889	Oct., 1889
Guiana	1168	Demerara and Essequibo rivers	M.	= 1.5	27 x 40	June, 1888	Oct., 1889
Santo Domingo Island	1169	Port Santa Barbara	M.	= 5.0	27.5 x 42.5	Sept., 1889	Oct., 1889
East Indies	1170	Western part of Java Sea and southern passages to China	D. long.	= 2.7	25.5 x 35	Jan., 1887	Oct., 1889
Peru	1171	Pacasmayo, Huanchaco, and Malabrigo roads, and Guanape Islands	M.	= 1.0	11.9 x 13.7	Sept., 1889	Nov., 1889
Do	1172	Huacho and Chancay Bays	M.	= 4.0	19.6 x 13.2	Sept., 1889	Nov., 1889
Chili	1174	Ports Caldera and Calderilla	M.	= 2.0	10.5 x 13.0	Oct., 1889	Nov., 1889
		Port Flamenco	M.	= 1.0	3.8 x 4.5		
Newfoundland	1175	Port Saunders and Keppel and Hawke harbors	M.	= 2.0	19.0 x 25.8	May, 1889	Nov., 1889
United States of Colombia and Ecuador	1176	Panama to Cape San Francisco	D. long.	= 4.5	25.8 x 42.4	Nov., 1888	Nov., 1889
Central America	1120	Approaches to the Gulf of Honduras	D. lat.	= 15.0	23.8 x 30.5	Aug., 1887	Dec., 1889
Ecuador and Peru	1177	Cape San Francisco to Paita	D. long.	= 4.5	29.5 x 37.5	Dec., 1888	Dec., 1889
Canada	1179	Miramichi Bay, New Brunswick	M.	= 1.5	23.4 x 34.6	Mar., 1889	Dec., 1889
Peru	1180	Independencia Bay	M.	= 1.0	17.5 x 21.0	Oct., 1889	Dec., 1889
Chili	1181	Cobija Bay and Gatico Cove	M.	= 2.0	8.8 x 10.8	Sept., 1889	Dec., 1889
Nova Scotia	1173	Sheet Harbor	M.	= 2.0	20.0 x 25.0	Apr., 1888	Jan., 1890
Peru	1183	Ports Islay and Mollendo	M.	= 4.0	10.0 x 14.4	Sept., 1889	Jan., 1890
Newfoundland	1182	Savage Island and Old Port au Choix	M.	= 6.0	19.0 x 26.0	July, 1889	Jan., 1890
Argentine Republic	1187	Bahia Blanca	M.	= 1.0	20.5 x 35.1	Jan., 1889	Jan., 1890
Peru	1184	Port Santa	M.	= 1.0	9.3 x 11.0	Nov., 1889	Jan., 1890
Do	1185	Port Samancho or Guambacho	M.	= 1.0	9.3 x 11.0	Dec., 1889	Jan., 1890
Nicaragua	1186	Greytown Harbor	M.	= 4.0	18.0 x 20.0	[illegible]	[illegible]

Peru	1178	Paita to Pisco	D. long.	= 4.5	28.0 x 42.0	Mar, 1890	Feb., 1890
Do	1190	Casma and Huarmey bays	M.	= 2.0	10.7 x 15.0	Jan., 1890	Feb., 1890
Brazil	1191	Rio Grande do Sul	M.	= 2.0	16.5 x 21.5	Aug., 1889	Feb., 1890
Lower California	1192	South Bay, Cerros Island	M.	= 2.0	14.5 x 18.5	Dec, 1889	Feb., 1890
Do	1193	San Quentin Bay to Cerros Island	D. lat.	=15.0	29.6 x 36.1	Dec., 1888	Mar., 1890
Do	1194	San Benito Islands	M.	= 4.0	19.4 x 24.6	Feb., 1890	Mar., 1890
Peru	1195	Ports San Nicolas and San Juan and Lomas Road	M.	= 0.5	16.1 x 17.8	Feb., 1890	Mar., 1890
Cuba	1196	El Portillo	1,000 yds.	= 6.95	18.6 x 23.4	Mar., 1890	Mar., 1890
British America	1197	Herschel Island	M.	= 1.0	11.5 x 14.1	Mar., 1890	Mar., 1890
		Pauline Cove	1,000 yds.	= 3.85	4.3 x 4.9		
Pacific Ocean	1198	Baker and Howland Islands	M.	= 4.0	11.3 x 16.8	Mar., 1890	Apr., 1890
Peru	1199	Ilo Road	M.	= 1.0	9.4 x 11.6	Mar., 1890	Apr., 1890
United States	1200	Erie Harbor, Pennsylvania	M.	= 6.0	20.8 x 34.5	Jan., 1890	Apr., 1890
Peru	1201	Port Bermejo	M.	= 4.0	8.5 x 10.5	Mar., 1890	Apr., 1890
Chili	1202	Port Papudo	M.	= 2.0	6.5 x 8.6	Feb., 1890	Apr., 1890
		Horcon and Quintero Bays	M.	= 1.0	6.5 x 8.6		
Chili	1203	Arica Road	M.	= 2.0	14.3 x 16.9	May, 1889	Apr., 1890
Lower California	1204	Port San Bartolomé	M.	= 2.0	16.5 x 18.5	Dec., 1889	Apr., 1890
East Indies	1205	Singapore and Rhio Straits	M.	= 0.5	28.5 x 37.3	Jan, 1888	Apr., 1890
Canada	1207	Quebec Harbor	M.	= 6.0	28.2 x 39.2	Jan., 1889	Apr., 1890
Portugal	1208	Approaches to the Tagus River and the harbor of Lisbon	M.	= 1.25	31.5 x 33.5	May, 1889	Apr., 1890
Chili	1209	Approaches to Coronel and Lota	M.	= 1.0	25.8 x 32.9	July 1889	Apr., 1890
Santo Domingo Islands	1210	Manzanillo Bay	M.	= 4.0	19.4 x 24.6	Mar., 1890	Apr., 1890
Pacific Ocean	1211	Canton Island	M.	= 0.5	7 x 10.5	Mar., 1890	Apr., 1890
		Canton Island anchorage	100 yds.	= 0.5	5.3 x 7.0		
		Phœnix Island	M.	= 2.0	5.3 x 7.0		
East India Archipelago	1206	New Harbor, Singapore	M.	= 6.0	13.5 x 19.6	Aug., 1889	May, 1890
Chili	1212	Lavata Bay	M.	= 1.0	7 x 8	Apr., 1890	May, 1890
		Pan de Azúcar anchorage	M.	= 1.0	7 x 8		
Peru	1213	Salaverry Road	M.	= 4.0	11.3 x 9.7	May, 1890	May, 1890
Do	1214	Atico road	M.	= 0.5	8.4 x 8.4	Apr., 1890	May, 1890
Rio de la Plata	1215	Flores Island	M.	= 8.0	16.1 x 16.7	Oct., 1889	May, 1890
Pacific Ocean	1216	The Hawaiian Islands and the islands to the westward	D. lat.	= 1.375	25.5 x 38.5	Apr., 1890	June, 1890
Peru and Chili	1218	Pisco to Arica	D. long.	= 4.5	27.4 x 40.4	Oct., 1889	June, 1890
Chili	1219	Arica to Caldera	D. long.	= 4.5	26.9 x 44.4	Dec., 1889	June, 1890
Do	1220	Caldera to Valparaiso	D. long.	= 4.5	27.6 x 36.9	Jan, 1890	June, 1890
Samoan Islands	1221	Safatu Harbor, Upolu Island	M.	= 4.0	14.5 x 18.3	Apr, 1890	June, 1890
Argentine Republic	1222	Bahia Blanca to Rio Negro	D. lat.	=15.0	26.1 x 37.0	Jan., 1890	June, 1890
Lower California	1223	Pichilinque Bay	M.	= 8.0	17.4 x 21.7	May, 1890	June, 1890
Azores	1224	Fayal Channel with Horta and Pine bays	M.	= 3.0	18.6 x 23.8	Apr., 1890	June, 1890

NOTE.—The scale of the chart is expressed in inches by the use of the abbreviations D. long.: the length of a degree of longitude on the equator; D. lat., the length of a degree of the meridian in the middle latitude of the chart; and M, the length of a nautical mile. The size of the chart is expressed in inches, measuring between the extreme edges of the border.

MISCELLANEOUS PLATES FINISHED DURING FISCAL YEAR.

New standard compass sheet, embodying instructions to engravers
Steel plates of standard publication notices, standard marginal lett
ing for charts, the office seal, and invariable notes concerning har
and special charts and lights.

Charts which have received important corrections and additions amounting to a redra of a portion of the chart.

General locality.	Catalogue number.	Title.	Character of correctio
British America	903	Juan de Fuca Strait to Queen Charlotte Islands.	Extensive correction shore-line and hydrogr resulting from recent veys.
Do	904	Queen Charlotte Island, Hecate Strait, and Dixon entrance.	Do.
Chili	446	Channels between Magellan strait and Gulf of Trinidad.	Do.
Do	447	Channels between gulfs of Trinidad and Peñas, lower part.	Do.
Do	447	Channels between gulfs of Trinidad and Peñas, upper part.	Do.
Hawaiian Islands	867	South side of Oahu	Do.
North Atlantic Ocean	21	North Atlantic Ocean, Sheet I, upper part.	Addition of Hudson Ba
China Sea	797	China Sea, southern portion, western sheet.	Changes in shore-line hydrography of Bo and Sumatra.
Bering Sea	68	Bering Sea and Arctic Ocean	Additions and correc from recent United S and Russian work.
West Indies	40	Windward Islands and eastern part of Caribbean Sea.	New compasses and tion lines.
South Pacific Ocean	825	South Pacific Ocean, Sheet III, western middle sheet, lower part.	Extensive changes in tions and outlines o ands, and additions of sea soundings.
Do.	825	South Pacific Ocean, Sheet III, western middle sheet, upper part.	Do.
Samoan Islands	97	Harbors in the island of Upolu, Samoan Islands.	Addition of plan of Harbor. Extensive c tions in hydr [illegible] apl Saluafata Bay [illegible] survey by the [illegible] the U. S. S. *Adam*
China Sea	796	China Sea, northern portion, western sheet.	Extensive changes in line and hydrograp Cochin, China.
Rio de la Plata	930	Rio de la Plata and approaches	Addition of plan of Island, and large c tions at Buenos Ayre
Canada	1967	Bay of Chaleurs	Extensive changes in hy raphy, names, and roads.

General locality.	No.	Preliminary title.	Scale.	Size.	When begun.	Remarks.
Newfoundland	20p	Southeast Newfoundland	D. lat. = 15.0	25 x42.7	May, 1887	Ready for engraver of letters.
Do	59p	Northeast Newfoundland	D. lat. = 15.0	24 x39.5	Dec., 1887	Ready for engraver of topography.
Canada	99p	Gut of Canso	M. = 1.0	24 x36	Nov., 1888	In hands of engraver of sand and fathom lines.
Do	100p	Great Bras d'Or	M. = 0.75	30 x34.5	Sept., 1888	In hands of engraver of letters.
Do	101p	Madame Island and Lennox Passage	M. = 2.0	25 x38	Sept., 1888	Ready for engraver of topography.
Ecuador	107p	Guayaquil River	M. = 0.5	24 x41	Nov., 1888	Awaiting data for completion of drawing.
Canada	127p	Passamquoddy Bay and approaches	M. = 1.0	29 x35.7	Mar., 1889	In hands of engraver of letters.
Malay Peninsula	134p	Singapore Roads	M. = 6.0	25 x24	May, 1889	In hand of engraver of topography.
Philippine Islands	148p	Manila Harbor	M. = 0.5	22 x32.5	Sept., 1889	In hands of engraver of letters.
East India Archipelago	149p	Gaspar Strait	D. lat. = 15.0	19.5x29	Mar., 1890	Awaiting information from Batavian Hydrographer.
Lower California	168p	Lagoon-head to San Bartolomé Bay	D. lat. = 15.0	29.8x39	Apr., 1890	Partially drawn.
West Indies	169p	Island of St. Lucia	M. = 1.0	26.4x37.9	Apr., 1890	In hands of draughtsman.
Japan	176p	Yokohama to Sikok Island	D. long. = 4.5	....	May, 1890	In hands of draughtsman.
Africa	183p	Madeira and Canary Islands with the adjacent coast of Africa.	D. long. = 4.5	31.4x43	Feb., 1890	In hands of draughtsman.
Guiana	193p	Maroni and Mana Rivers	M. = 1.0	24 x34	Apr., 1890	Ready for engraver.
Mexico	196p	Laguna de Terminos, western entrance	M. = 2.0	14.6x18.5	Apr., 1890	Will be published in July, 1890.
Do	200p	La Paz Harbor	M. = 6.0	26 x35.6	May, 1890	Ready for engraver.
Do	202p	Laguna de Terminos, Puerto Real entrance	M. = 4.0	19.5x24.6	May, 1890	In hands of engraver of topography.
Japan	203p	Gulf of Tokio	M. = 0.75	....	May, 1890	In hands of draughtsman.
Canada	92p	Caraquette, Shippegan, and Miscou harbors	M. = 1.5	25 x39.3	July, 1888	Will be published in July, 1890.
Japan	175p	The Strait of Tsugar to Yokohama	D. long. = 4.5	....	June, 1890	In hands of draughtsman.
Do	177p	The Strait of Korea, with the adjacent coasts of Japan and Korea.	D. long. = 4.5	....	June, 1890	In hands of draughtsman.
Island of Santo Domingo	204p	Cape Halti Harbor	M. = 4.0	17.8x23	June, 1890	Ready for engraver.
Bahamas	205p	Wide opening	M. = 3.0	10.3x13.2	June, 1890	Ready for engraver.
China	206p	Hong-Kong Harbor	M = 12.0	27 x35.8	June, 1890	In hands of draughtsman.
Bahamas	207p	Ship-channel	M. = 3	10 x11.8	June, 1890	Ready for engraver.
		The Fleeming	M. = 1	10 x11.8		
Do	208p	Egg Island to Eleuthera Island	M. = 2	21.7x24.7	June, 1890	In hands of draughtsman.

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[illegible]

Summary.

	Total to June 30, 1889.	Finished during the year.	W'thd'wn during the year.	Total to June 30, 1890.
ngraved chart plates	505	68	2	571
iscellaneous plates	103	2	....	105
ltos of engraved chart plates	129	20	....	149
asos of engraved chart plates	73	....	....	73
npressions of engraved plates for issue	....	25,485	....	....
roof of engraved plates for office use	....	608	....	....

MISCELLANEOUS DRAFTING.

Besides the drafting incident to the construction and correction of harts, time equivalent to the services of one man for nine hundred and inety-three hours was spent in drawing diagrams illustrating the esults of the turning and speed trials of the U. S. S. *Atlanta*, *Boston*, *hicago*, and *Yorktown*, and time equivalent to the services of one an for two hundred and forty-two hours was spent in miscellaneous rawing for the Division of Marine Meteorology.

DEEP-SEA SOUNDINGS.

The record of deep-sea soundings has been modified so as to give all he facts known about each sounding. Heretofore a representative nding of each group was selected for entry. The conventional manr in which this sounding was marked on the sounding sheets for identiation was shown opposite the entry, and all the soundings of which ne entered one was the representative were marked in the same manner n the sounding sheets. The number of distinct conventional marks pon a sheet covering a region moderately well sounded out soon beame very large and the marks themselves became intricate. Morever they were found to take up valuable space and to become blurred nd unrecognizable after the sheet became soiled. No distinguishing arks are now used in connection with the plotted soundings, but each ounding is entered separately in the Record of Deep-Sea Soundings ccording to the method shown by the accompanying specimen-page eading:

From latitude —— to latitude ——, and from longitude —— to longitude ——.

Finding longitude.	Position of sounding.		Depth in fathoms.	Character of bottom.	Temperature.	Authority.			Remarks.	Reference.	Number of sheet.	By whom plotted.	Date of plotting.
	Latitude.	Longitude.				Commanding officer.	Ship.	Date.					

All the reliable deep-sea soundings that have been observed have een plotted on fifteen sheets of the North Pacific Ocean, and fifteen dditional sheets have been outlined to receive the data for the South acific.

TERRESTRIAL MAGNETISM.

A chart of the lines of equal magnetic variation on the we South America has been constructed in connection with the curr in that region, and a similar chart for the coast of China and th is in progress. The Record of Magnetic Observations at Sea and Record of Magnetic Observations at Shore Stations have been extended. In the latter record the collections of the observed of the variation of the compass at ten stations, in addition to ferred to in the last annual report, have become sufficient to the deduction of empirical equations for predicting values of tion and assigning rates of secular change. In these equa represents the variation for any time, and t the time expressed in and fractions of a year counted from 1850, plus when forward and when backward.

General locality.	Name of place.	Equation giving variation for any year.	Prob ror of comp from equa
Mexico	Vera Cruz	$V=-4.768+0.608\sin t-3.860\cos t$	
Patagonia	Punta Arenas and Port Famine.	$V=-20.184+2.002\sin t-2.372\cos t$	
Venezuela	La Guayara	$V=-3.489+1.585\sin t+0.042\cos t$	
West Indies	Curaçao	$V=-4.674+2.595\sin t+0.777\cos t$	
Do	Fort de France	$V=-2.726+2.926\sin \frac{11}{12} t+1.528\cos \frac{11}{12} t$	
Java	Batavia	$V=+1.494-1.194\sin 0.9t-2.928\cos 0.9t$	
Do	Soorabaya	$V=+2.744-2.706\sin 0.9t-3.832\cos 0.9t$	
China	Hong Kong	$V=+0.990+0.389\sin 0.8t-2.047\cos 0.8t$	
Do	Shanghai	$V=+1.9084-0.000012t+0.000149t^2$	......
Do	Pekin	$V=+2.179+0.0131t+0.000117t^2$	

By differentiating the equations in the preceding table and con ing the circular measure into minutes of arc, the following equat giving the rate for any year, have been formed:

General locality.	Name of place.	Equation giving rate for any year.	Annu for
Mexico	Vera Cruz	$dV=+0.608\cos t+3.860\sin t$	decreasi
Patagonia	Punta Arenas and Port Famine.	$dV=+2.096\cos t+2.483\sin t$	do
Venezuela	La Guayara	$dV=+1.585\cos t-0.042\sin t$	do
West Indies	Curaçao	$dV=+2.717\cos t-0.813\sin t$	do
Do	Fort de France	$dV=+3.342\cos \frac{11}{12} t-1.744\sin \frac{11}{12} t$	increasi
Java	Batavia	$dV=-1.125\cos 0.9t+2.757\sin 0.9t$	decreasi
Do	Soorabaya	$dV=-2.550\cos 0.9t+3.832\sin 0.9t$	do
China	Hong Kong	$dV=+0.326\cos 0.8t+1.715\sin 0.8t$	do
Do	Shanghai	$dV=-0.00072+0.00\ 72t$	increasi
Do	Pekin	$dV=+0.786+0.001404t$	decreasi

The computation of the results of the observations for magnetic i sity, dip, and variation made by Lieut. Charles Laird and En Holcombe and L. M. Garrett, U. S. Navy, of the United States graphic Longitude Expedition under the command of Lieut. Norris, U. S. Navy, have given the following values:

Locality.	Date.	Var. E.	Dip.	Hori inte (Br un
		° '	° '	
Very Cruz (Mexico)	Dec., 1888	7 11	44 20	......
Coatzacoalcos (Mexico)	Feb., 1889	6 53	43 03	
Salina Cruz (Mexico)	Mar., 1889	6 50	40 02	
Puerto Plata (St. Domingo Islands)	Dec., 1889	0 37	49 50	
Santa Ana (Curacao)	Jan., 1890	2 28	39 13	
La Guayara (Venezuela)	Feb., 1890	2 51	37 35	

The observations made at the above named places, together with the
onstants of Kew theodolite magnometer No. 54, with which the obser-
ations for intensity and variation were made, and the general instruc-
ions which accompanied the instrument, are prepared for publication.

THE RECORD OF GEOGRAPHIC POSITIONS.

The work of collecting and recording determinations of meridian dis-
ances and relating them to the best determined values of the second-
ry meridians from which they are measured has been continued.
The first of a series of extracts from this work, entitled "The Geo-
raphic Positions of South America," has been prepared for publication,
is respectfully forwarded to you. It comprises an alphabetically
ged list of names of places in South America whose latitudes and
gitudes are given, together with the secondary meridians upon which
longitudes depend and the authority upon which the determination
s. United States naval officers have determined fourteen second-
y meridians in South America by telegraphic measurements to the
ridians of the United States and Europe, and to one or more of them
most all chronometric measurements in this region have been related.

CHANGES IN METHODS OF CARRYING ON THE WORK.

The system by which each chart keeps an open account with all
ources of information, as well as with the draughtsmen and engravers
o work upon it, has been extended so as to include the keeping of
open account between geographical sections and the sources of in-
mation which affect them. By this system, to the extent of the in-
mation received, all corrections are made upon a chart with certainty
o a given date; and, when a new chart is to be constructed, all avail-
e information is readily collected by referring to the account of in-
ormation respecting the geographical section or sections within which
t lies.

The general information book, in which all items of information were
oted and charged to the charts affected, has been replaced by a card
ndex arranged according to geographical sections bounded by parallels
f latitude and meridians of longitude. The following is a specimen
f the cards used:

HYDROGRAPHIC OFFICE,

Division of Chart Construction.

No. ....

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ocality, ...

eposited in ...., Reference, ...

ubject, ...

(Name.) (Date.) (Ship.)

uthority, ...

eceived ....

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....

emarks, ...

....

The effort to make the charts more accurate and cheaper has been
onstant. The use of standard methods for treating different parts of
hart has grown until almost every part is now so treated. The adap-

tation of transferring to copper-plate engraving has been exte
include, besides the seal and marginal notes, the title notes c
lights, harbor and special charts, tidal current arrows, and so
and heights. All borders and scales are cut and shaded by
and recently, on a number of plates, the sand areas have been ma
engraved with excellence at a great reduction in cost.

Some years ago the method of delineating hill-work by contou
and roulette shading was substituted for the method by hachures.
hill-work usually resulted with a stiff and unnatural appearance
the contours were drawn with an unreasonable degree of re
but with no facts to indicate the actual irregularities none cou
sonably be introduced. The contour lines also conveyed a false im
sion of accuracy to many, and hence they have been avoided in
where purely imaginary ones would of necessity have been emplo
carry out the method, and a system has been devised by which p
expression is given to the work without the use of contours.

In accordance with the result of the deliberations of the boar
pointed to consider the best form of compass-rose and the relative
of true and magnetic bearings for use in the publications of the H
graphic Office, a new compass-rose appears upon the most recent c
It consists of a magnetic and a true system, each having a gradu
to degrees and to fractions of a point, and affords a simple means
terchanging true and magnetic bearings and courses.

RECOMMENDATIONS CONCERNING FUTURE WORK.

Complete series of general and special coast charts for the coa
China, Japan, and Corea have been laid out, and the collection
discussion of the data for them have been commenced. It is res
fully recommended that the entire force available for the constru
of new charts be concentrated upon this work as soon as the wo
Canada, the West Indies, and South America can be brought to a

Respectfully submitted.

G. W. LITTLEHALES,
Assistant in cha

The HYDROGRAPHER.

DIVISION OF SUPPL
July 1, 1

SIR: I have the honor to submit the following report for the
year ending June 30, 1890.

Lieut. D. W. Coffman, who was to-day detached from duty und
Hydrographic Office, has been in charge of the Division of Sup
the entire year, with immediate supervision of the Hydrographic
section. Much of the data in regard to that portion of the divis
from notes and memoranda supplied by him.

The work of the division has increased during the year in ever
ticular. Although every effort has been made to avoid unnec
issues of charts to vessels of the Navy this part of the work h
tained proportions greatly exceeding those of any previous year.
number of charts sold to agents exceeds slightly last year's recor
would have been much greater but the delay in receiving the cata
of the office from the printer prevented the appointment of addi
agents until the end of May. A very large part of the delay in
ing the catalogue may be saved by selecting a more favorable ti

ear for printing it than the necessities of the office compelled us to ccept last year, and I would so recommend. Two catalogues corrected n such a manner as to render them available to be turned immediately nto "copy" for the printer will be kept in hand.

HYDROGRAPHIC OFFICE SECTION.

In this section are kept on hand, corrected to date, a supply of Hydrographic Office charts sufficient to meet all ordinary demands for sale, or issue to vessels of the Navy. Three copies each of all Coast Survey charts are likewise kept on hand and corrected in order to meet emergencies in fitting out or supplying naval vessels.

The force of the section consists of one clerk, two draughtsmen, one colorist, and one laborer. One additional draughtsman has been temporarily assigned to the section for special work in the comparison of charts. The regular force, as given above, is precisely the same as it was some years ago when the number of charts published and on hand was but a fraction of the present number, and the total issues in greater disproportion. Nothwithstanding all efforts to employ this force to the greatest possible advantage and to give up all work not absolutely necessary, even though desirable, the limits of its capacity have been reached and an increase is absolutely essential. I would therefore recommend that the temporary detail of an additional draughtsman be made permanent.

The number of plate charts now on hand is 568, an increase of 64 during the year. The system of recording upon the margin of the plate the correction that has been applied to it is now in full operation.

These corrections are divided into two classes: First, small corrections that may, with very little trouble, be added to an old chart by comparison with a copy of later date; second, extensive corrections that are either impracticable to add to an older copy, such as changes in hydrography and typography affecting a considerable area, or a large number of small corrections, so numerous as to render any attempt to correct by hand inadvisable. The small corrections are subdivided into such as are so explicity described in Notices to Mariners that they admit of direct plotting from such descriptions, and small corrections obtained from other sources, such as comparison of foreign charts, light lists, data furnished by ship-masters and others, etc. It will be some time before the benefits of the system will be generally appreciated, except in this office, but here the gain will be immediate and considerable. It will enable the office to give to those seeking it full information of the state of correctness of any charts in their possession by a simple reference to the dates of last correction on the copies in question. To avoid as much as possible the necessity of application to this office for such information, a list of all charts extensively corrected during the preceding month is published in the Notice to Mariners. The large ocean and sailing charts rarely receive corrections of great importance to navigators and a very large percentage of those which are returned from vessels of the Navy will be at once placed upon the shelves, after receiving the slight corrections obtained from a comparison with the standard copy. Under the old system it was impossible to find out what corrections were added to charts between any given dates or even whether corrected at all, without exhaustive comparison, which is very expensive and therefore impracticable.

The number of photolithographic charts now on hand is 280. Of this number 267 are charts for navigating purposes and 13 are index charts. During the past six months all the photolithographic charts have been compared with all the foreign charts in the office covering ground and the proper corrections made. Twenty-five pn graphic charts were canceled during the year and four became ex A very considerable number of the charts now on hand have be of much value. This is particularly true of those on both South America, which region is now covered by plate charts on convenient scale and of a better size. There has been little or mand for these charts for some years, and as the errors are i the necessary amount of work to keep them corrected has likew creased. In some cases the errors are of such character as to correction out of the question, and I would recommend that all o series covered by the new plate charts be condemned.

The supply of the following-named photolithographed charts is n exhausted and as the demand for them is considerable I would r that plate charts be made to replace them as soon as possible:

356. Island of Granada with harbor plans.
386. Chiriqui Lagoon.
403. Anchorages on the coast of Yucatan.
802. Plans in the Caroline Islands.
803. Plans in the Caroline Islands.
26*a*. Bahama Banks.
26*b*. Bahama Banks.

No. 26*d* of the same series is entirely exhausted and should be r also.

The present editions of index charts A and D of the general published by the office are exhausted, and I would recommend that be replaced by such of the plate index charts recommended in the re of the board appointed to examine into this subject as will cover same ground. And I would further recommend that the same p be pursued as the editions of the other charts become exhausted. this means the office would eventually become possessed of a syste plate index charts at a slight annual expense. The cost of engra these charts is by no means so great as that of engraving charts purposes of navigation, while the amount of handwork to keep pl lithographic editions in order in some cases exceeds that on any nau chart in the office.

The following out of the plan of the new catalogue also require ditional plates similar to those already inserted. I would recom the addition of a number of plates in the most important localities year. The form of the catalogue will require a slight modificati adapt it to the present system of recording chart corrections and insertion of index plates. These changes are partly such as would been made in the last edition, but the haste of the original prepar prevented such alterations at that time. Had the delay in pri been foreseen they could easily have been made.

Copies of Coast Survey charts that have received corrections are forwarded directly from the Coast Survey Office to vessels and br offices under an arrangement with that office made during the month of the fiscal year ending June 30, 1889. This system works successfully and leaves little to be desired. In cases of emergenc charts are furnished from our own shelves, on which we keep a supply to meet such cases, as has been previously mentioned.

A number of additional sales agents were appointed as soon as c of the new catalogue were received from the printer. There are se parts of the world, however, in which no publications of this office be obtained. The entire coast of South America, both east and gh covered by Hydrographic Office charts and sailing directions in fullest manner, has not throughout its length a single agency. No uth American nation publishes charts or sailing directions extending ch beyond its own territory, and few of them even cover their own ts. The language of the maritime world is chiefly English, and herefore our charts should have a ready sale throughout this region. policy of the Hydrographic Board on foreign geographic names, if pted, will do much to promote the sale of our charts here, as else- e, by making them more available for the use of mariners speaking er than the English language.

In view of these facts I would recommend the establishment of agen- ies in a number of the principal South American ports, such as Valpa- aiso, Iquique, Callao, and Guayaquil, on the west coast, and Buenos Ayres, Montevideo, Rio de Janeiro, Bahia, Pernambuco, and Para, on he east. The present time is particularly favorable for placing our harts and books on sale in South America, as we have recently com- pleted the sailing directions and a large number of harbor plans of both oasts, and have on the west coast just published the last of a series of arge coasting charts, on a particularly desirable scale, and covering the oast from Panama to Valparaiso.

The following is a summary of the receipts, issues, etc., of charts for he year:

Statement of charts for fiscal year ending June 30, 1890.

	1889, third quarter.		1889, fourth quarter.		1890, first quarter.		1890, second quarter.		Total.
	H. O. C.	C. S. C.	H. O. C.	C. S. C.	H O. C.	C. S. C.	H. O. C.	C. S. C.	
opies of charts received:									
From photolithographer	......	......	225	......	......	......	......	......	225
From division chart construction	5, 446	......	4, 955	......	6, 170	......	6, 051	......	22, 622
From Coast Survey	......	652	......	415	......	965	......	452	2, 484
Total	5. 446	652	5, 180	415	6, 170	965	6, 051	452	25, 331
opies of charts issued:									
To naval vessels	2, 439	......	1, 679	......	1, 912	......	1, 651	......	6, 681
	......	1	......	129	......	16	......	332	477
To agents	2, 415	......	2, 646	......	1, 936	......	2, 154	......	9, 151
To archives	57	......	64	......	88	......	85	......	294
	......	241	......	190	......	196	......	219	855
To office use	94	......	143	......	155	......	157	......	549
	......	2	......	29	......	10	......	68	109
To branch offices	1, 161	......	377	......	298	......	556	......	2, 391
To merchant vessels	15	......	35	......	17	......	50	......	117
To foreign hydrographers	95	......	32	......	33	......	251	......	411
To home correspondents	134	......	93	......	121	......	220	......	568
Miscellaneous	941	......	792	......	295	......	411	......	2, 439
	......	99	......	38	......	56	......	34	227
Total	6, 351	343	5, 861	395	4, 855	277	5, 534	653	24, 269
harts published	7	......	14	......	18	......	26	......	65
opies of charts condemned	101	......	128	......	30	......	68	......	327
	......	506	......	83	......	72	......	80	741
harts canceled	2	......	4	......	7	......	13	......	26
lans canceled	7	......	5	......	5	......	5	......	22
opies of canceled charts condemned	22	......	353	......	724	......	1, 373	......	2, 472

BRITISH ADMIRALTY SECTION.

The functions of the British admiralty section are to keep on hand, orrected to date, copies of all British admiralty charts issued to United

States vessels; to issue all charts (Hydrographic, Br Coast Survey) to United States vessels, and to keep of such issues.

The work of this section has more than doubled du The subjoined table giving the receipts and issues du years shows the relative increase in part. The accounts has been much increased, not only due to the issued, but to the system of holding back charts of from the vessel's sphere of action until it becomes pro may be needed; the annual saving on issues by t charts, temporarily unnecessary, is, however considera the additional trouble.

The new system of books and receipts is now in full all its details and is a most marked improvement in acc over the method hitherto followed. A large part of present chief of the division, then in charge of the B section, was taken up in working out the details of the sy change was carefully considered before it was made.

The trouble connected with the inefficiency of the avoided, leaving as a source of error only the losses in mistakes in handling. The latter, by a very simple sy is reduced to a minimum. The books of the section are no character as to give at a glance full information of every c ship, its date, time of sending, and receipt, the number of (and of the order if obtained from the Coast Survey or British They also exhibit at all times the amount of issues and r the beginning of the fiscal year to any date required. The been obtained by simplifying and systematizing the forme keeping the accounts. Considerable has been added, but qu if not more, has been done away with.

The new form of receipt for charts forwarded by Stevens i work admirably. The nine months that it has been used is cient to test it. In every way it more than exceeds the m expectations. Navigators have filled out the blanks left for with great care and but one mistake is so far believed to have and this was of such a character as to be self-detecting.

The station catalogues are very much cut up by numerous tions. The amount of time necessary to correct a catalogue fo so large that the cost of the labor equals the original cost of I would therefore recommend that as many of them be reprinte the ensuing year as possible.

On account of the large number of vessels likely to be con and in commission during the fiscal year 1891-'92, the estimates purchase of British admiralty charts and books should be creased. I would recommend an addition of at least 25 per c amount appropriated 1889-'90. If whole squadrons are to be ou simultaneously, as during the preceding year, it will be nec keep on hand a larger supply of each number.

The amount of work in the British admiralty section is now ing the present force to its utmost capacity. Any further inc work must needs entail an increase of force. The additional draug recommended to be detailed for the Hydrographic Office sectio be employed in the British admiralty section very advantageo times, for the work frequently runs behind and with the presen ber of draughtsmen it takes weeks and even months to catch u

The following ships have received full outfits of charts and for various stations during the year: *Galena, Yantic, Dolphin,*

nd *Petrel*, North Atlantic station; *Chicago*, *Boston*, *At-*
n, European station; *Chicago*, South Atlantic station;
ic station; *Charleston*, Pacific station.
g vessels have received special outfits: *Portsmouth*, *York-*
go, *Ranger*, *Constellation*, *Pensacola* (2), *Baltimore*, *Triton*,
ocacy, *Charleston*, *Thetis*, *Nina*, *Catalpa*, *St. Mary's*, *Bos-*
eyden, *Vesuvius*, *Philadelphia*, *Concord*.
g is a summary of the charts received and issued, and a
the general work of the section, for the past two years:

	1888-'89.	1889-'90.
miralty agent	3,152	5,354
. S. Dispatch agent	1,568	1,704
ssels (returned outfits)	2,298	1,839
y (complimentary)	229	186
anch offices (returned)	83	52
Admiralty	7,330	9,135
	3,720	7,104
fice section (Hydrographic Office charts)	6,225	6,681
ceived	17,275	22,920
iralty to		
ssels from this Office	3,469	5,952
ssels, B. F. Stevens	1,568	1,704
aphic offices	272	349
	128	596
phy and Chart Construction	49	
	37	137
Admiralty	5,523	8,738
hic Charts from this Office	6,225	6,681
arts, from this Office and Coast Survey Office	3,720	7,104
sued	15,468	22,519

harts on hand July 1, 1889	10,939	
arts received during year	9,135	
	20,074	20,074
arts issued during year	8,738	
harts condemned	1,182	
ures	9,920	9,920
Admiralty Charts remaining on hand		10,154

Corrections on British Admiralty Charts.

	1888-'89.	1889-'90.
mbers		
charts affected by Notices	1,509	1,553
charts corrected by Notices	2,751	3,670
arts corrected by hand from British Admiralty and other data	6,889	7,200

been 77 new British Admiralty Charts received and put
itish Admiralty Charts canceled by Hydrographic Office
f the British Admiralty Charts issued to United States
been withdrawn or canceled by the Admiralty. Total
ssued to vessels, 2,020.
submitted.

L. S. VAN DUZER,
Ensign U. S. Navy, in charge.

OGRAPHER.

States vessels; to issue all charts (Hydrographic, British admiralt
Coast Survey) to United States vessels, and to keep accurate ac
of such issues.

The work of this section has more than doubled during the past
The subjoined table giving the receipts and issues during the pa
years shows the relative increase in part. The work of keepin
accounts has been much increased, not only due to the increased nu
issued, but to the system of holding back charts of localities di
from the vessel's sphere of action until it becomes probable tha
may be needed; the annual saving on issues by this withholdi
charts, temporarily unnecessary, is, however considerable and well
the additional trouble.

The new system of books and receipts is now in full working or
all its details and is a most marked improvement in accuracy and lu
over the method hitherto followed. A large part of the time
present chief of the division, then in charge of the British adm
section, was taken up in working out the details of the system, an
change was carefully considered before it was made.

The trouble connected with the inefficiency of the receipts i
avoided, leaving as a source of error only the losses in the mail
mistakes in handling. The latter, by a very simple system of c
is reduced to a minimum. The books of the section are now of s
character as to give at a glance full information of every chart on
ship, its date, time of sending, and receipt, the number of the r
(and of the order if obtained from the Coast Survey or British admi
They also exhibit at all times the amount of issues and receipts
the beginning of the fiscal year to any date required. The resu
been obtained by simplifying and systematizing the former meth
keeping the accounts. Considerable has been added, but quite as
if not more, has been done away with.

The new form of receipt for charts forwarded by Stevens is fou
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cient to test it. In every way it more than exceeds the most sa
expectations. Navigators have filled out the blanks left for chart
with great care and but one mistake is so far believed to have occ
and this was of such a character as to be self-detecting.

The station catalogues are very much cut up by numerous c
tions. The amount of time necessary to correct a catalogue for is
so large that the cost of the labor equals the original cost of pri
I would therefore recommend that as many of them be reprinted d
the ensuing year as possible.

On account of the large number of vessels likely to be commi
and in commission during the fiscal year 1891–'92, the estimates n
purchase of British admiralty charts and books should be mu
creased. I would recommend an addition of at least 25 per cent.
amount appropriated 1889–'90. If whole squadrons are to be fitt
simultaneously, as during the preceding year, it will be necess
keep on hand a larger supply of each number.

The amount of work in the British admiralty section is now
ing the present force to its utmost capacity. Any further incre
work must needs entail an increase of force. The additional draugh
recommended to be detailed for the Hydrographic Office section
be employed in the British admiralty section very advantageou
times, for the work frequently runs behind and with the present
ber of draughtsmen it takes weeks and even months to catch up.

The following ships have received full outfits of charts and
for various stations during the year: *Galena, Yantic, Dolphin,*

ore, *Essex*, and *Petrel*, North Atlantic station; *Chicago*, *Boston*, *Atlanta*, *Yorktown*, European station; *Chicago*, South Atlantic station; *Alliance*, Asiatic station; *Charleston*, Pacific station.

The following vessels have received special outfits: *Portsmouth*, *Yorktown* (2), *Chicago*, *Ranger*, *Constellation*, *Pensacola* (2), *Baltimore*, *Triton*, *Saratoga*, *Monocacy*, *Charleston*, *Thetis*, *Nina*, *Catalpa*, *St. Mary's*, *Boston*, *Atlanta*, *Leyden*, *Vesuvius*, *Philadelphia*, *Concord*.

The following is a summary of the charts received and issued, and a comparison of the general work of the section, for the past two years:

	1888-'89.	1889-'90.
Received from—		
J. D Potter, Admiralty agent	3,152	5,354
B. F Stevens, U. S. Dispatch agent	1,568	1,704
United States vessels (returned outfits)	2,298	1,839
British Admiralty (complimentary)	229	186
Divisions and branch offices (returned)	83	52
Total British Admiralty	7,330	9,135
Coast Survey	3,720	7,104
Hydrographic Office section (Hydrographic Office charts)	6,225	6,681
Total charts received	17,275	22,920
Issued (British Admiralty) to—		
United States vessels from this Office	3,469	5,952
United States vessels, B. F. Stevens	1,568	1,704
Branch Hydrographic offices	272	349
Archives	128	596
Divisions of Supply and Chart Construction	49	....
Miscellaneous	37	137
Total British Admiralty	5,523	8,738
Hydrographic Office Charts from this Office	6,225	6,681
Coast Survey Charts, from this Office and Coast Survey Office	3,720	7,104
Total charts issued	15,468	22,519

British Admiralty Charts on hand July 1, 1889	10,939	
British Admiralty Charts received during year	9,135	
Total	20,074	20,074
British Admiralty Charts issued during year	8,738	
British Admiralty Charts condemned	1,182	
Total expenditures	9,920	9,920
Total British Admiralty Charts remaining on hand		10,154

Corrections on British Admiralty Charts.

	1888-'89.	1889-'90.
From Notices to Mariners:		
Total number of charts affected by Notices	1,509	1,553
Total number of charts corrected by Notices	2,751	3,670
Total number of charts corrected by hand from British Admiralty and other data	6,880	7,200

There have been 77 new British Admiralty Charts received and put on issue, 21 British Admiralty Charts canceled by Hydrographic Office Charts, and of the British Admiralty Charts issued to United States vessels 5 have been withdrawn or canceled by the Admiralty. Total number now issued to vessels, 2,020.

Respectfully submitted.

L. S. VAN DUZER,
Ensign U. S. Navy, in charge.

The HYDROGRAPHER.

DIVISION OF SAILING DIRECTIONS, *July* 1, 1

SIR: I have the honor to submit the following report of this di for the fiscal year ending June 30, 1890.

The compilation of new sailing directions and the revision of th editions has been steadily proceeded with, and the issue of the Notices to Mariners and their extracts has continued without inte tion. The benefit gained by the consolidation of the books, notices archives into one division, and grouping them together, has great creased its efficiency by having the needed references for each se close at hand, while the proximity of the printers does away wit vexatious delay and annoyance previously experienced in the re of proof, correction of errors, and explanations rendered neces the technical character of the work.

During the year the following publications have been placed on is

H. O. No. 9. American Practical Navigator, Bowditch, edition of 1890.
H. O. No. 13. Useful Tables, Bowditch, edition of 1890.
H. O. No. 74. List of Lights of the World, Vol. V. North, Baltic and White Se tion of 1890.
H. O. No. 87. International Signal Code, edition of 1890.
H. O. No. 88. East Coast of South America.
H. O. No. 89. West Coast of South America.
H. O. No. 90. The Development of Great Circle Sailing.
H. O. No. 91. Table of Meridional Parts.
H. O. No. 92. Ice and Ice Movements in Bering Sea and the Arctic Ocean.
H. O. No. 93. Ice and Ice Movements in the North Atlantic Ocean.
H. O. Catalogue of Charts and Sailing Directions, and other publications of U States Hydrographic Office.
H. O. No. 94. Report of the International Meteorological Congress.

Supplements to the following sailing directions were also prep and placed on issue, viz:

Caribbean Sea and Gulf of Mexico, Vol. I, H. O. No. 86; Vol. II, H. O. No. 64.
English Channel, Part I, H. O. No. 34; Part II, H. O. No. 35.
Indian Ocean, H. O. No. 85.
West Coast of South America, H. O. No. 89.
Bay of Biscay, H. O. No. 60.
Mediterranean Sea, Part III, H. O. No. 42.
Light List, Vol. I, H. O. No. 30 (edition of 1889); Vol. II, H. O. No. 31; Vol. H. O. No. 32.
International Signal Code, H. O. No. 87.

In addition, the following were prepared and are ready for press

Sailing directions:
  Nova Scotia, Bay of Fundy, Gulf and River of St. Lawrence.
  Caribbean Sea and Gulf of Mexico, Vol. II, second edition.
  British Columbia and Vancouver Island.
  The Azores, Madeira, Canaries, and Cape Verde islands.
Supplements to—
  H. O. No. 37. Mediterranean Sea, Vol. I (in press).
  H. O. No. 38. Mediterranean Sea, Vol. II (in press).
  H. O. No. 64. Mediterranean Sea, Vol. IV (in press).
  H. O. No. 52. Northwest, west, and south coasts of Spain and coast of Portug
  H. O. No. 86. Caribbean Sea and Gulf of Mexico, Vol. II, No. 2, and a com new edition of the six volumes of the List of Lights of the World.
Sailing directions in preparation:
  China Sea Directory, Vol. I (B. A. Vol. IV revised).
  Africa Pilot, Vol. I (to include the Azores, Madeira, Canaries, and Cape islands).

The following sailing directions were withdrawn from issue in quence of the publication of H. O. Nos. 88 and 89 (east and west c of South America):

British Admiralty, South America Pilot, Part I (east coast), Part II (west coas
H. O. No. 13. Coast of South America, Part I.
H. O. No. 59. Chili, Bolivia, and Peru.

During the year the following new publications were received and issued to ships and branch offices, and all publications canceled by them were withdrawn from issue.

From Coast Survey:
  Subdivision No. 22, Atlantic Coast Pilot.
  Atlantic Tide Tables, 1890.
  Pacific Tide Tables, 1890.
From the Light-House Board:
  Light List United States, 1890.
  Beacons, Buoys, and Day-marks, 1889—all districts.
From the Treasury Department:
  List of Merchant Vessels, 1889.
From the Bureau of Education:
  Vocabulary, English and Eskimo, compiled by Ensign Roger Wells, U. S. Navy, and Mr. John W. Kelly.
From the Nautical Almanac Office:
  The Ephemeris and Nautical Almanac for 1890, 1891, and 1892.
  The Nautical Almanac for 1890, 1891, and 1892.
From the British Admiralty (purchased):
  Revised Supplement to Red Sea Pilot.
  Norway Pilot, Part I.
  Supplement to China Sea Directory, Vol. IV.
  H. N. 4 of 89, West Coast of Scotland, Part II.
  H. N. 6 of 89, North Sea Pilot, Part II.
  H. N. 7 of 89, Ireland, Part II.
  Africa Pilot, Part III.
  Revised Supplement to Australia Directory, Vol. I.
  North Sea Pilot, Part III.
  China Sea Directory, Vol. II.
  Light Lists: British Islands, 1890; North, Baltic and White Seas, 1890; Western Coast of Europe, 1890; Mediterranean Sea, 1890 (to European squadron alone).
  Bay of Bengal Pilot.
  Supplement to Bay of Bengal Pilot.
  Australia Directory, Vol. II.
  H. N. 1 of 90. Pacific Islands, Vol. II.
  H. N. 2 of 90. South American Pilot, Part II.

The branch hydrographic office at Savannah, Ga., was fitted out July 23, 1889.

The following libraries were furnished with a complete set, as far as possible, of Bureau of Navigation and Hydrographic Office publications:

Franklin Institute Library, Philadelphia, Pa.
University of Toronto, Toronto, Canada.

SUMMARY.

The following is a statement in regard to publications received and issued by the division during the fiscal year ending June 30, 1890:

Quarter.	Received.	Issued.
First	830	954
Second	1,126	1,010
Third	1,731	1,274
Fourth	2,378	693
Total	6,065	3,931

This list does not include the beacons, buoys, and day-marks for the different districts of the Light-House Board nor the Light-House Board Light Lists; neither does it include the Hydrographic Office Light Lists, nor the supplements to light lists and sailing directions.

Seventy-three British Admiralty publications were sent from I direct to ships in commission by Mr. B. F. Stevens, U. S. D Agent.

In the above lists are included the British Admiralty publicat bought during the year (830) and issued to vessels and branch h graphic offices (511).

BOOKS OF REFERENCE AND SERIAL PUBLICATIONS.

There have been catalogued and placed on the shelves 224 books reference, together with the usual serial publications relating to hydr raphy.

The editions of the new Sailing Directions, published during the y were limited to 300, in continuation of the policy of the preceding The advantage gained over the old system of printing editions of 1,500 to 2,000 is that the latter become obsolete before being exha while the smaller number lasts during the average lifetime of the Sa ing Directions and, as the corrections accumulate, rendering revis necessary, the publishing of a new edition does not involve the who sale condemnation of large quantities of books.

The original plan determined upon, whereby the Sailing Directi were made supplemental to the charts, was so far modified that additional information was included in the more recent publica which were very favorably criticised abroad. It was found nece also to resume the corrections of the books to which reference was in the Notices to Mariners (which practice had been discontinued) cause of complaints to that effect being made by navigators of v going into commission, and this change went into effect early du the past year, all books on issue affected being corrected on the day the notice appears.

It is greatly to be regretted that the policy of proceeding as rapidl as possible with the publication of our own Sailing Directions has been so far realized as to have placed on issue the only two other umes necessary to complete the Western Hemisphere, viz: (1) N Scotia, Bay of Fundy, Gulf and River of St. Lawrence. (2) B Columbia and Vancouver Island.

The manuscripts of these books reached completion in ample tim have been set in circulation, but the same old difficulty—lack of s cient funds to print them—operated to prevent. It is false ec that renders necessary the purchase of publications from abro , the same can be, and are, produced here, embodying the latest cor tions and sources of information, and prepared on a system that is result of much deliberation, as well as of the invited criticisms of e perienced navigators both of the regular and mercantile service. the office here much valuable time is given to these publications, the cost of experienced labor in the production of these carefully pared manuscripts is thrown away and the latter become valueles suffered to remain long unprinted, simply because from the nature the work its value consists in its prompt appearance.

This office should cover the waters of the globe with its own ch and sailing directions, not alone from motives of economy but be it is not impossible that the occasion might arise when the of such complete sets of charts and books would become an tua cessity; as in the case of a war with Great Britain, for e, could hardly expect her to supply us with the necessary directi the safe conduct of our vessels.

To quote from my last report—

> This subject is one that demands serious consideration, and it is earnestly hoped hat increased facilities will be extended to this office, that this result may be obained.

In continuation of the plan outlined, the following books are now being revised: (1) Africa Pilot, Part I. (2) China Sea Directory, Vol. I.

In the former, the old, H. O. publication, "Azores, Madeira, Canaries," etc., will be inclnded, as in the Admiralty Pilot, there being no use of issuing separate publications.

With the new China Sea Directory the plan is to reverse the numbers given in the Admiralty publications, Vol. I being the old Vol. IV, d the course pursued is to proceed from north to south, and not in t opposite direction, as is the case with the Admiralty book, the ground covered being the coasts of Kamchatka, the east coast of Siberia, Korea, and the Japanese Islands.

The first edition of the Caribbean Sea, Vol. II (H. O. No. 64) being about exhausted, a new one has been prepared, and is now ready, with all information to date. In the old edition the course of instructions was from south to north. Those of the new book will follow the reverse order, as is the case with all other sailing directions of the eastern coasts of America.

In March the new edition of the International Signal Code, 500 copies, was received and placed on issue. In addition to the regular corrections, Part III was entirely revised, principally with a view to its usefulness to American navigators, and several important additional sections were added, as—

1. Storm signal and semaphore service of the world.
2. Life-Saving Service of the United States.
3. Time-ball system of the United States.
4. Distress, danger, and warning signals, etc.

As the last edition of this book appeared in 1884, the present American edition speedily ran through, and but few copies remain.

Several manuscripts on hand, completed a long time ago, some of them in the branch offices, are now practically valueless, inasmuch as they would have to be gone over completely from the beginning on account of the numerous changes and corrections that have accrued. Among these are the following: Coasts of Denmark and Holland; Sailing Directions for the North Sea; Reported Dangers in the North Pacific; Islands of the Pacific; Baltic Sea and Gulf of Finland; Reported Dangers in the Atlantic.

This means time and expert labor thrown away, as previously referred to, and all because of insufficient force to revise the work and of lack of funds to publish them when completed.

Applications are still being made for copies of No. 58, "Navigation of the Pacific Ocean and China Seas," of which the edition has been exhausted for over a year, but no opportunity has offered for a revision. Although No. 56, "West Coast of Mexico," has been withdrawn from issue and its place taken by No. 84, covering the same ground, so much has been omitted from the latter book, in accordance with the new system, that the former continued to be sought after. When the present edition is exhausted, I would recommend the issue of the book on the lines of the older edition. As stated in the last report, these books are prepared for the use of the merchant marine, as well as the regular service, but the vessels of the former are so meagerly supplied with charts and other aids to navigation that, to be of practical value to them and to command a ready sale, the books must be as complete a possible without being bulky or burdened with useless repetitions.

LIGHT-LISTS.

The List of Lights of the World, comprised in six volumes, has received and corrected to date, ready for republication. Owing to a la of funds, but three volumes of the series (I, II, III) could be plac issue during the fiscal year ending June 30, 1889, although the volumes were ready; and within the past year only one, volume V, reprinted.

The last editions of volumes IV and VI were published in the e part of the year 1887, the data having been corrected to date. Sinc 1887 the large number of necessary changes in the data for exis lights, together with the establishment of numerous new lights, resulted in an accumulation of corrections, necessitating a great d labor when a volume of the original edition is required to be correct to date. The books are disfigured thereby, and this was particu the case with Volume V, which was in such condition that even a plement would prove nearly as expensive as a new edition.

The supplement to light-lists lessens the work of correction, but gain that object and to be of further use they should be publis regularly, which the printing facilities of this office have not yet mitted.

The constant changes in lights and light systems throughout world cause a rapid accumulation of corrections, which render advis the annual publications of revised editions of the light-lists, even in connection with the use of the supplements.

Volumes IV and VI now show the accumulated corrections of ab three years, and as no supplements have ever been issued and many o the corrections have never been published, new editions should be lished at once and in the order of their importance, viz, IV, VI, if it not possible to publish them simultaneously.

Volume VI, being confined to the lights of the British Islands, c be readily purchased and utilized.

The constant services of one intelligent person should be available for keeping corrected copies of the Standard Light Lists and preparing supplements and light-lists for publication.

In regard to the foregoing I would add that, in view of the gr number of corrections that have accrued in one year, even to the three volumes received from the Government Printing Office (viz, Vols. I, II, and III), it was found necessary to prepare supplements to bring th to date and avoid the labor and expense of correcting these bo by hand, which takes up a great deal of the time of an assistant w services are needed for other work.

It was thought that, these supplements once printed, the type be kept set up and corrected or added to as became necessary, a supplements appear semi-annually, which would keep the lists corre to date at little expense, until money could be spared for the new i of the volume itself.

In accordance with this idea supplements were prepared to Vols. I, II, and III, and if these publications could be gotten out regularly they would serve as new editions of the original volumes, in conjunction with them, and the office be saved the cost of their reprint. Owing to the press of work and the frequent interruption of the printers to serve other offices of the Department, this work is often greatly delayed.

It is now necessary to purchase the Admiralty Light-Lists (IV and VI) for the use of our vessels on the European station, until the new editions of our own lists can appear, but it is earnestly hoped that this is only a temporary convenience, and that this publication, which has always been one of the standard ones of the U. S. Hydrographic Office, will be regularly continued in pursuance of the policy of being independent of all foreign sources for the supply of our vessels with charts, sailing directions, and all nautical works which are a necessity to the navigator.

A revised edition of Volume IV, The Atlantic Coasts of Europe and the Southern Shores of the English Channel and North Sea, should be published as soon as possible.

VESSELS FITTED OUT.

The following vessels were supplied with outfits of sailing directions and nautical books from the division during the year:

Name of ship.	Outfit furnished.	Remarks.
Galena	North Atlantic Station	Regular outfit for cruising
Portsmouth	North Atlantic Station and special	Special books for crossing to Lisbon.
Yorktown	North Atlantic Station	Regular outfit for cruising.
Chicago	Special	Nautical books and books for navigation in New York waters.
Monocacy	Special Asiatic	Nautical books and such sailing directions as necessary.
Yantic	North Atlantic Station	Regular outfit for cruising.
Baltimore	Special North Atlantic	
Pensacola	do	Regular outfit for cruising to Cape of Good Hope.
Dolphin	North Atlantic Station	Regular outfit for cruising.
Baltimore	Complete North Atlantic outfit.	Do.
Alliance	Asiatic Station	Do.
Charleston	Pacific Station	Do.
Saratoga	North Atlantic station and special.	Special books for crossing to Lisbon.
Thetis	Special	Asiatic and Pacific books for proposed survey.
Chicago	European and South Atlantic	Regular outfit for cruising: South Atlantic books sent to South America.
Boston	do	
Atlanta	do	
Yorktown	do	
Vesuvius	Special North Atlantic	Covering the coast between Boston and Pensacola.
Essex	North Atlantic station	Regular outfit for cruising
Petrel	do	Do.
Philadelphia	Special	For trial trip.
Concord	do	Do.

The difficulties existing in the way of a comprehensive and uniform system of spelling foreign geographic names, have occasioned frequent vexatious annoyances and delays in the completion of publications for years past. This subject is one that has excited such universal attention from hydrographic offices and geographical societies all over the world, and so many attempts have been made to reach a universal system of orthography, that the efforts to eradicate the confusion existing have resulted in various systems, each adapted to the requirements of the language involved, but all striving for uniformity, and tending toward the preservation of the proper name as officially spelled in the countries having jurisdiction.

By your direction a board consisting of Mr. Gustave Herrle, of chart construction, Mr. Boynton Leach, assistant in charge of Notices to Mariners, and myself, was appointed to consider and report upon a syst of comprehensive rules for the uniform orthography of foreign graphic names in the publications of this office, and, in dealing wi names originating in Asiatic and Polynesian languages, not writt in Roman characters by the natives, or which are unwritten, to inv gate the system of rendering them adopted by the British Admira with a view to modifying this system if necessary, and rendering it a propriate for adoption by this office. Or, at its discretion, the board i to report an original system, if found necessary.

In accordance with this order, the subject is being carefully consid ered, and a circular letter relating to the subject and requesting plete information as to standard authorities, details of systems of t scription and transliteration, and methods of dealing with geo names, was addressed to all foreign hydrographers. Replies have bee received containing much valuable information on the subject from hydrographers of the following countries, viz, England, France, Ger many, Austria, Spain, Holland, Italy, Denmark, and Japan; the De Minister of Marine, Canada, the Japanese Chargé d'Affaires at Washing ton, and the Administration des Phares de l'Empire Ottoman, at C stantinople. Upon the subject of Korean names, Ensign John B Bernadou, U. S. Navy, of the office of naval intelligence, was of ver great assistance, and his extensive knowledge of the native nomen ture very materially aided the board in its labors.

When replies have been received from several other foreign office the report will be finally prepared and submitted for your approval.

NOTICES TO MARINERS.

The publication of the weekly Notices to Mariners, together with separate extracts, and their distribution, in accordance with the thirtee divisions of the earth's surface, referred to in my last report, has bee successfully continued, and has fully occupied the time and attention of the assistant in charge of this important work, who, in addition, is charged with the care and correction of the standard copies of the volumes of "List of Lights of the World."

During the fiscal year just ended 1,164 announcements of importa to naviga ion were published in the form of notices to mariners, an in crease of 117 over the preceding year. This increase is best shown follows:

1887	590	1889	1,04
1888	904	1890	1,16

The circulation of the weekly notices and extracts amounted to 807,955. These were all issued promptly on the day of publication, viz, Saturday of each week, and enough has been said in previous reports concerning the appreciation (and the actual necessity) of this publication by the service, and the maritime community generally, to show the importance of this method of disseminating nautical information. Being of itself a condensed form of sailing directions, containing the very latest infor mation covering the entire globe, and appearing regularly every week, it conveys to the navigator knowledge of the changes that are constantly occurring, of newly discovered dangers to navigation, all information, in fact, that may affect his charts and sailing directions, and the conse quent safety of his vessel.

The entire number of extracts and notices which contained the very valuable report of Lieut. Commander Charles H. Stockton, U. S. Navy, concerning the recent cruise of the U. S. S. *Thetis* in Bering Sea and the Arctic Ocean, ran out, and a reprint of the two portions of this report, contained in Notices Nos. 45 of 1889 and 2 of 1890, had to be made, as the information is much in demand. These reports are now combined into one.

In accordance with the report of the board appointed by you to consider the subject, a very important change was made in the notices.

The system of reporting bearings has been modified to the extent that the *true* bearing and its corresponding *magnetic* bearing are both ven, the true bearings being expressed in degrees and the magnetic in points. It is believed that this will prove more satisfactory to the class of mariners who prefer to use magnetic bearings, as it relieves them from computation.

The yearly "Index of Notices" was completed as usual in ample time for its publication coincidentally with the last weekly issue of the year 1889, and was actually published within a month thereafter, a new and pleasing feature in its history. It is hoped that the printing facilities of this office, which have been so much improved of late, will admit of the next index appearing with the last notice of the current year, as it should do.

The efficiency of the division would be greatly enhanced by the services of a translator, as much time would be saved and much additional information from original sources be gotten at first hand, the importance of which was shown in my report of last year.

The recommendation made in reference to the division of Vol. I, of the Light Lists into two parts, embracing the east coasts of North and South America and the West India Islands, and the west coasts of North and South America and the Pacific islands, respectively, is again repeated.

The changes in these lists accumulate so rapidly that unless the supplements can appear almost semi-annually, the cost and labor of correcting them is too great. The volume, as at present issued, is too large, and if divided into two they could more easily be corrected as required by vessels in commission on the Atlantic and Pacific stations.

Finally, in regard to the Light List, I would call attention to the admiralty system of their publication. By keeping the type set up continually, corrections can be made in the forms as fast as occurring, and the revised editions issued regularly each year, upon which their value as authorities depends.

With this method, when many corrections occur, proof-sheets could be printed quarterly or semi-annually and pasted in the books affected, thus reducing the cost and labor of correction to a minimum.

The first cost of the necessary type alone, if space can be obtained for the forms, will not exceed the present cost of the publication of one edition, and this expense becomes finally reduced to the actual cost of printing and paper.

ARCHIVES.

Information of every sort relating to hydrography has been steadily received, and the custodian has been fully occupied with the work of classifying, arranging, and issuing these documents, which are charged up against the charts and sailing directions affected, while a summary s published in the weekly notices, in order that the information may at once reach the maritime community. Sometimes it happens that it is impossible to publish the reports because they can not be verified owing to the omission of some very important feature, as, for ins the bearings; or if they are given, whether they are true or ma the date of the chart used, accuracy of chronometer error and rate. Such information has to be withheld until the missing details have obtained before it can appear in the form of a Notice to Mariners.

Four hundred documents have been received, with innumerable numbers, indexed and catalogued in the archives during the year, upwards of thirteen hundred letters written and sent from the di Of these more than half related to the subject of hydrographic in mation received from navigating officers of United States Naval v and from the members of the consular service abroad.

Through the kindness of Dr. F. O. St. Clair, chief of the Consular Bureau, State Department, the attention of the consular service was called to the importance of furnishing the Hydrographic Office with every possible source of information relating to harbor improvements, lights, dangers to navigation, currents, etc., pilot and harbor dues, coal and food supplies, commercial advantages, etc., all of which is of corresponding value in keeping the publications of the Office correct to date.

Hydrographic information received from United States vessels during the fiscal year commencing July 1, 1889, and ending June 30, 1890.

Adams: Commander E. T. Woodward, commanding; Lieut. W. H. Beehler, navigator.
Adams: Lieut. Commander J. J. Hunker, commanding; Lieut. W. H. Beehler, navigator.
Albatross: Lieut. Commander Z. L. Tanner, commanding.
Alert: Commander J. G. Green, commanding; Lieut. F. E. Green, navigator.
Alliance: Commander H. C. Taylor, commanding.
Atlanta: Capt. J. A. Howell, commanding; Lieut. N. E. Niles, navigator.
Chicago: Capt. H. B. Robeson, commanding; Lieut. R. P. Rodgers, navigator.
Dolphin: Commander G. F. F. Wilde, commanding; Lieut. Richardson Clover, executive officer in charge of the work, soundings in North Atlantic.
Enterprise: Commander B. H. McCalla, commanding; Lieut. F. H. Fickbohm, navigator.
Galena: Commander G. W. Sumner, commanding; Lieut. A. B. Speyers, navigator.
Jamestown: Lieut. R. S. Jasper.
Kearsarge: Commander H. Elmer, commanding; Lieut. C. W. Ruschenberger, navigator.
Michigan: Capt. H. F. Picking, commanding.
Monocacy: Lieut. Commander W. W. Riesinger, commanding; Lieut. J. H. Bull, intelligence officer.
Monongahela: Commander G. E. Wingate, commanding; Lieut. T. D. Bolles, navigator.
Nipsic: Lieut. Commander H. W. Lyon, commanding; Lieut. R. G. Davenport navigator.
Omaha: Capt. F. V. McNair, commanding; Lieut. J. B. Murdock, navigator.
Omaha: Capt. B. J. Cromwell, commanding; Lieut. J. M. Miller, navigator.
Palos: Lieut. Commander J. E. Craig, commanding; Lieut. F. M. Bostwick, navigator.
Pensacola: Capt. A. R. Yates, commanding; Lieut. F. W. Nichols, navigator.
Pinta: Lieut. Commander O. W. Farenholt, commanding.
Ranger: Commander F. A. Cook, commanding.
Ranger: Lieut. Commander G. C. Reiter, commanding.
Richmond: Capt. A. V. Reed, commanding; Lieut. F. E. Sawyer, intelligence officer.
Swatara: Commander J. McGowan, commanding; Lieut. C. P. Perkins, navigator.
Tallapoosa: Commander F. M. Dickins, commanding; Lieut. J. K. Cogswell, navigator.
Thetis: Lieut. Commander C. H. Stockton, commanding; Ensign J. A. Bell, navigator.
Yantic: Commander C. H. Rockwell, commanding.
Yorktown: Commander F. E. Chadwick, commanding; Lieut. J. C. Colwell, intelligence officer.

Valuable hydrographic information has been received from the following United States consuls, viz:

Allen, William G., Kingston, Jamaica.
Baker, Edward L., Buenos Ayres, Argentine Republic.
Bird, Winfield S., La Guayra, Venezula.
Bissinger, Erhard, Beirut, Syria.
Brent, H. M., Callao, Peru.
Currie, James (consular agent), Karachi, India.
Dickson, Almor F., Gaspé Basin, Quebec.
Dockery, Oliver H., Rio de Janeiro, Brazil.
George, Newton J., Charlottetown, Prince Edward Island.
Grellet, Charles T., Algiers, Algeria.
Hollis, George F., Cape Town, Africa.
Jones, Joseph A., Aden, Arabia.
Lamantia, Vincent, Catania, Sicily.
Lay, Richard G., (consul-general), Ottawa, Ontario.
Marston, Henry C., Malaga, Spain.
McMaster, William B., Carthagena, Colombia.
Merriam, Joseph W., Iquique, Chili.
Molloy, Thomas N., St. John's, Newfoundland.
Moore, Dwight (vice-consul), Aden, Arabia.
Mullen, Daniel M. (commercial agent), Sagua la Grande, Cuba.
Newton, Robert S. (vice-consul), St. Paul de Loando, West Africa.
Peter, William (consular agent), St. Lucia, West Indies.
Reimer, Otto E., Santiago, Cuba.
Schuyler, Eugene (consul-general), Cairo, Egypt.
Severance, Henry W., (consul-general), Honolulu, Hawaiian Islands.
Simons, Oliver H., Hong-Kong, China.
Stickney, George F. (consular agent), St. Andrew's Bay, New Brunswick.
Tanner, George C., Picton, Nova Scotia.
Turner, Robert W., Cadiz, Spain.
Tweedie, A. T. (consular agent), Suez, Egypt.
Webb, Alexander R., Manilla, Philippine Islands.

ARCHIVE CHARTS.

During the final month of the last fiscal year the archive charts were placed in the hands of Mr. C. P. Bowles, draughtsman, to whom was assigned the care of re-arranging, classifying, and comparing the charts (some 12,000 in number), and so placed as to be readily accessible for reference, and the latest editions to be on the shelves. On taking charge, this task, a very considerable undertaking, was found to be a most perplexing one, as dates and nationalities had become mixed and numbers shifted, and a search for a particular locality often required more time and patience than could be spared when a chart was needed to verify reports for publication in the Notices to Mariners, or to settle some disputed point for the Division of Chart Construction. By a simple form of book-keeping the charts can now be kept in order without much additional assistance, though errors will creep in under the most careful management, and certainly will be increased when the proper keeping of the charts is considered secondary to some other kind of work given to the draughtsman in charge of the charts to perform.

The archives possess a copy of every British Admiralty chart; but the lists of French and other foreign charts are limited to those made from their own surveys. As a compilation, carried through several editions, with monthly and annual corrections, is more reliable than the original from which it is taken, I would respectfully suggest that every chart made by any nationality be procured. In the foreign Notices to Mariners references are often made to charts not on our shelves for the reason above given. Besides facilitating the operations of the assistant in charge of the Notice to Mariners, the charts now excluded from our lists would furnish, very often, material aid to the division of chart construction and to this division, as well as the divisions of supply and issue.

Besides the work of overhauling, arranging, registering, delivering, and receiving charts, the keeper has examined and corrected 26 Br Admiralty charts belonging to the U. S. S. *Michigan*, and has exam critically all of the new supply of U. S. Engineers charts of lakes; and also overhauled 362 copies of Hydrographic Office char old dates before condemning them; also all the note-books, papers, charts of Captain Belknap's Deep Sea Sounding Expedition, and C John Rodgers's Exploring Expedition; and after arranging the s turned them into the manuscript section of the archives for the c dian of that department to register.

The number of charts received in the archives during the fiscal is as follows:

British Admiralty	783	Spanish	
Dutch	13	Imray & Son (London)	
French	58	U. S. Coast and Geodetic Survey	
German	26	Hydrographic Office	
Italian	7	U. S. Engineers	
Japanese	8		
Portuguese	5	Total June 30, 1890 (received)	
Russian	16	Total June 30, 1890 (condemned)	

The number of charts sent out of the chart-room and returned d the year is about 6,000, to which, if 2,100 be added (the number of copies), it will show that the keeper had to handle over 8,000 char that time.

As during the previous year information on all subjects perta to hydrography has been supplied, covering questions relating t existence of dangers to navigation, harbor improvements, surveys, etc., and much pains taken to obtain data from outside sources, the inquiries were not on subjects immediately connected with the of this office, the principle being to endeavor always to furnish t formation sought for. It is to be regretted, on this score, that our li of reference is not more extensive.

Both coasts of South America are now covered by our own and sailing directions, each embracing the latest information fro obtainable sources. As the list of foreign agents shows that we none in this portion of the world, I would recommend the establish of agencies in the following ports, viz, Rio de Janeiro, La Plata Montevideo, east coast, and Valparaiso, Callao, and Iquique, west that the publications of this office may be brought to the attenti the merchantmen trading in these waters. Attention was called t advisability of this step by letters recently received asking for ce of our publications and referring to the large number of inquiries of shipping firms by masters of American and other vessels. Alth copies of the Notices to Mariners and similar periodicals are ke file at the consulates, application is more frequently made to the chandlers and others with whom sea faring men are brought into contact in port.

Several changes have been made in the force of the division d the year, notably the transfer of Mr. T. S. O'Leary, assistant t editor of the Notices, whose special adaptability to the work mad services particularly valuable.

The most efficient aid has been rendered by all connected wit division, and it would be difficult to especially designate any parti individual, the work done and the results achieved being familiar t from observation and weekly report.

Very respectfully,

CHAS. M. MCCARTENEY,
Lieutenant U. S. Navy, in char

The HYDROGRAPHER.

DIVISION OF MARINE METEOROLOGY,
July 7, 1890.

SIR: I have the honor to submit the report of this division for the fiscal year ending June 30, 1890.

No change was made in the general plan followed in previous years in carrying out the routine work. Special attention was paid to collecting observations made at noon, Greenwich mean time, recorded on form 105, with the result that 420 new names were added to the list of vessels keeping these forms, while only 32 meteorologic journals were received. In distributing and collecting the forms great assistance was rendered by ship-brokers, steamship companies, and others, as well as by United States Consuls, who, by a circular issued from the State Department, dated March 1, 1890, were directed to assist the Hydrographic Office as much as possible in collecting meteorologic observations and general hydrographic information. In accordance with an agreement for the interchange of data between the Hydrographer and the Chief Signal Officer all the Greenwich noon observations, with special reports on miscellaneous subjects, were sent to the Signal Office as soon as they had been utilized.

The observations recorded on form 105, relating to the North Atlantic Ocean, are plotted on synoptic charts with the exception of those on the direction of cloud motion and on the state of the sea. An attempt has been made to make the synoptic charts as complete as possible by plotting all the observations received too late for use in the preparation of the Pilot Chart, but the work is steadily dropping behind hand. An index of the plotted observations ought also to be prepared, so that it can be readily ascertained from what ship any one observation has been received; at present it requires a long search to verify a plotted observation. As careful a check as possible has been kept on the recorded errors of barometers, and there is reason to believe that the trustworthiness of the utilized barometer observations has been greatly increased. All the fog reports received have been plotted on charts by months, and a series of charts is preparing on which are plotted published fog reports antedating our own records. Charts have been prepared on which are plotted for each month since January, 1882, the reported positions of icebergs and field ice in the North Atlantic. The remarkably early appearance of ice off the Grand Banks this season led to an effort to obtain observations hereafter from more northerly regions than those reached by vessels already sending reports to this office. Ensign Hugh Rodman, U. S. Navy, under orders from the Secretary of the Navy, was detailed to proceed to Halifax, Nova Scotia, and St. John's, Newfoundland, to obtain all possible co-operation and information. His report (H. O. No. 93) gives the result of his mission. A great addition to the previously published information on ice in the waters near Bering Straits was made by Ensign Simpson's "Report on Ice and Ice Movements in Bering Sea and Arctic Basin" (H. O. No. 92).

The Hydrographic Bulletin, called the Weekly Supplement previous to September 6, 1889, was issued weekly. Giving in a convenient form all the recent reports of derelicts, wrecks, ice, change in buoys, etc., it is very useful to vessels along our coasts. The Pilot Chart, of which Mr. Everett Hayden, marine meteorologist, is the editor, has been issued regularly each month. With the Chart for July, 1889, the limits were extended from 4° east longitude to 10° east longitude. Changes have also been made in the symbols employed, which have added to its practical usefulness as well as to its appearance. Much valuable information has been published on the Pilot Chart, but its main effort has been to give the seaman information that will aid his judgment in dete ing action before and during a gale. Improved storm diagrams, explanatory text, have appeared on each chart; ten synoptic c September 3–12, 1889, published as a supplement to the October Chart, show the progress and development of a violent hurri diagram showing the conditions prevailing at noon, Greenwic time, November 25, 1888, during a hurricane, is published on the chart; the use of oil to lessen the danger from heavy seas has persistently urged, and, to make seamen thoroughly familiar with character and meaning of the signals displayed by the Signal Servic at the stations along the Atlantic and Gulf coast, diagrams with planatory notes have been published each month.

The preparation of a series of daily weather maps for the North South Atlantic from October, 1889, to May, 1890, inclusive, to whic reference was made on the Pilot Chart for June, 1890, and for wh active co-operation is most earnestly desired, is a work of the very grea est importance as well to the navigator as to the meteorologist; ever effort should be made to make the charts as complete as possible.

An international meteorologic congress was in session at Paris from September 19–26, 1889. Under orders from the Secretary of the Navy, Lieut. Aaron Ward, U. S. Navy, attended the congress as the accredited representative of the Hydrographic Office. His excellent repor of the proceedings of the congress has been published as H. O. No. 94

The following changes have occurred among the personnel of the divi-ion: Ensign Hugh Rodman, U. S. Navy, reported for duty July 6, 1889; Ensign John E. Craven, U. S. Navy, reported for duty November 1, 1889; Mr. J. M. Dashiel resigned November 7, 1889; Mr. C. G. Northup resigned March 17, 1890, and Mr. J. M. Burlew was transferred to the division in his place; Mr. A. H. Dutton was transferred to the Bureau of Construction on April 1, 1890, and Mr. T. S. O'Leary was transferred to this division in his place on May 1, 1890. It is earnestly recommended that the vacancy left by Mr. Dashiel's resignation be filled.

Respectfully submitted.

H. M. WITZEL,
Lieutenant U. S. Navy, in charge of division.

The HYDROGRAPHER.

DIVISION OF BRANCH OFFICES,
July 1, 1890.

SIR: I have the honor to submit the report of this division for th fiscal year ending June 30, 1890.

This division was established by your predecessor just before you came into office as Hydrographer, and consequently has been in exist ence about seven months; prior to this all of the mailing, printing, and issuing of Hydrographic Office publications, the printing of forms and issuing of supplies, came under the cognizance of the different divisions and main office. By the establishment of other branch hydrographic offices the increased demand of Hydrographic Office publications and the enlarging of the mailing lists, with the natural increase of handling matter pertaining thereto, it was found that too much work was entailed on the different divisions with their limited force, so that it became necessary to consolidate all these functions in a separate division.

In this division are contained all stationery and office supplies, the Pilot Chart of the North Atlantic Ocean, Bulletin, Notices to Mariners d Extracts, all forms, miscellaneous, meteorological and for use of ich offices, Ranger, Longitude, and Surveying expeditions; also such ruments as belong to the office. Instruments, previously on charge stored in the office as a depot have been transferred to the Bureau uipment. Back numbers of all Hydrographic Office publications kept on hand for issue. Correct mailing lists are kept for the mailof the Pilot Charts, Bulletins, Notice to Mariners, Extracts, and other publication that is ordered to be distributed by mail.

All forms are submitted to the Hydrographer for approval before ng printed, care being taken to insure correctness in the details, as lation size, shape, type, number of form, edition, etc. All issues of pplies are made only on the receipt of an approved requisition by the Hydrographer on the form supplied for the purpose.

lling list for—	Number of copies mailed.
Weekly Bulletin (555)	1,950
Weekly Notices to Mariners (360)	1,150
Monthly Pilot Charts (630)	3,000

Very respectfully,

H. S. WARING,
Lieutenant U. S. Navy.

The HYDROGRAPHER.

ESTIMATES OF APPROPRIATION REQUIRED FOR THE SERVICE OF THE FISCAL YE ENDING JUNE 30, 1892, BY THE BUREAU OF NAVIGATION.

FOR THE SUPPORT OF THE BUREAU OF NAVIGATION.

A.

Salaries.

Chief clerk (increase of $200, submitted) (July 11, 1890)	$
Four clerks of class 4 (July 11, 1890)	
One clerk of class 4 (submitted)	1
Three clerks of class 3 (July 11, 1890)	
* One clerk of class 3 (submitted)	1
Three clerks of class 2 (July 11, 1890)	4
* One clerk of class 2 (submitted)	1
Four clerks of class 1 (July 11, 1890)	4
One clerk at $1,000 (July 11, 1890)	1
One copyist at $900 (July 11, 1890)	
One copyist at $720 (July 11, 1890)	
One assistant messenger (July 11, 1890)	
Three laborers at $660 (July 11, 1890)	1,9
Total	33,

NAVAL ACADEMY.

For pay of professors and others.

For one professor of mathematics, one of chemistry, and one of physics, at $2,500 each. (June 30, 1890.)	7,50
For two professors (assistants), viz: One French and Spanish, and one of English studies, history and law, at $2,200 each. (June 30, 1890)	4,400.
For five assistant professors, viz: One of English studies, history, and law, three of French, and one of drawing, at $1,800 each. (June 30, 1890.)	9,000.
For one sword-master at $1,500 and two assistants at $1,000 each. (June 30, 1890.)	3,500.
For one boxing-master and gymnast. (June 30, 1890.)	1,200.
For one assistant librarian. (June 30, 1890.)	1,400
For one secretary of the Naval Academy. (June 30, 1890.)	1,
For two clerks to the Superintendent, one at $1,200 and one at $1,000, respectively. (June 30, 1890.)	2
For one clerk to the commandant of cadets. (June 30, 1890.)	1
For one clerk to paymaster. (June 30, 1890.)	1
For one dentist. (June 30, 1890.)	1,
For one baker. (June 30, 1890.)	
For one mechanic in department of physics and chemistry. (June 30, 1890.)	
For one cook. (June 30, 1890.)	
For one messenger to the Superintendent. (June 30, 1890.)	
For one armorer. (June 30, 1890)	
For one chief gunner's mate. (June 30, 1890)	
For one quarter gunner. (June 30, 1890)	
For one coxswain. (June 30, 1890)	
For one seaman in the department of seamanship. (June 30, 1890)	
For one attendant in the department of astronomy and one in the department of physics and chemistry, at $300 each. (June 30, 1890)	
For six attendants at recitation-rooms, library, store, chapel, and offices, at $300 each. (June 30, 1890)	1,
For one bandmaster. (June 30, 1890)	

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* To enable the Bureau to perform the extra work required by the provisions o act of February 7 and April 11, 1890, certificates are being supplied as rapidly a present clerical force of the Bureau will permit, but unless this force is increase other duties are neglected, 18 months will be required to answer the applicatio file awaiting action.

For twenty-one first-class musicians, at $348 each. (June 30, 1890)	$7,308.00
For seven second-class musicians, at $300 each. (June 30, 1890)	2,100.00
For pay of organist at chapel of Naval Academy. (June 30, 1890)	300.00
Total	52,323.00

For increase of pay of clerk to Superintendent from $1,000 to $1,200* (submitted)	200.00
For increase of pay of clerk to paymaster† (submitted)	100.00
For increase in pay of seaman in department of seamanship‡ (submitted)	48.00
For book-binding for library and department of study § (submitted)	600.00
Total	948.00

For special course of sturdy and training naval cadets, as authorized by the act of Congress, approved August 5, 1882. (June 30, 1890)	5,000.00

For pay of watchmen, mechanics, and others.

For captain of watch and weigher, at $2.50 per diem. (June 30, 1890)	912.50
For four watchmen, at $2 per diem. (June 30, 1890)	2,920.00
For foreman of gas and steam heating works of the Academy, at $5 per diem. (June 30, 1890)	1,825.00
For labor at gas-works and steam buildings; for masons, carpenters, and other mechanics, and laborers, for care of buildings, grounds, wharves, and boats. (June 30, 1890)	37,864.95
For one attendant in purifying-house of gas-house at $1.50 per diem. (June 30, 1890)	547.50
Total	44,069.95

For pay of steam employés, Naval Academy.

For pay of mechanics and others in departments of steam engineering. (June 30, 1890.)	7,824.50

For repairs and improvements, Naval Academy.

For necessary repairs to public buildings, pavements, wharves, and walls inclosing the grounds of the Naval Academy, improvements, repairs, furniture, and fixtures. (June 30, 1890.)	21,000.00
For furnishing and fitting gymnasium, already appropriated for, to become immediately available.‖ (Submitted)	5,000.00

For heating and lighting the Naval Academy.

For fuel and for heating and lighting the Academy and school-ships. (June 30, 1890.)	17,000.000

For contingent and miscellaneous expenses, Naval Academy.

For purchase of books for the library. (June 30, 1890.)	2,000.00
For stationery, blank-books, models, maps, and text-books for use of instructors. (June 30, 1890)	2,000.00
For expenses of the Board of Visitors to the Naval Academy, being mileage and $5 per diem for each member, for expenses during actual attendance at the Academy. (June 30, 1890)	1,500.00

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* This increase is asked for to equalize the pay of clerks who are performing the same kind of duty. The present incumbent of the office is efficient and fully earns the increased salary asked for.

† This increase is asked for to make the salary of the pay clerk paid from the Naval Academy appropriation, equal to the lowest rate of pay to pay clerks at other stations. (See pay table, Navy Regulations.)

‡ This increase is asked for to make the pay of the seamen at the Naval Academy equal to that of seamen in general service as now allowed by law. The latter has been increased since the original estimates and appropriations for the former.

§ There is a considerable amount of book-binding, which must be done upon short notice, to books which should not be sent from the Academy, such as text-books, record books in constant use, etc. These, with repairs to library books, binding pamphlets, etc., will keep one man constantly employed and it will be economical to have the work so done.

‖ This amount is asked for to finish inside, and furnish the gymnasium after being repaired.

For purchase of chemicals, apparatus, and instruments in the department of physics and chemistry and for repairs to the same. (June 30, 1890)	$2,500.
For purchase of gas and steam machinery, steam pipes and fittings, rent of buildings for the use of the Academy, freight, cartage, water, music, musical and astronomical instruments, uniforms for the bandsmen, telegraphing, feed and maintenance of teams, current expenses and repairs of all kinds, and for incidental labor and expenses not applicable to any other appropriation. (June 30, 1890)	32,000
For store in the department of steam engineering. (June 30, 1890)	8[illegible]
For material for repairs in steam machinery. (June 30, 1890)	1,000.
For repairs to "Santee's" Wharf, to be immediately available.* (Submitted)	4,000.
For continuing the grading and improvement of the property condemned under act making appropriation for the fiscal year ending June 30, 1890, and the adjacent ground, and for the improvement of the water-front of said grounds, to be made immediately available. (Submitted)	15,000.

RECAPITULATION—NAVAL ACADEMY.

For pay of professors and others. (June 30, 1890)	52,323.
For special course of study. (June 30, 1890)	5,000.
For pay of watchmen and others. (June 30, 1890)	44,069.
For pay of employés in department of steam engineering. (June 30, 1890)	7,824.
For repairs and improvements. (June 30, 1890)	21,000.
For heating and lighting Academy and school-ships. (June 30, 1890)	17,000.
For contingent expenses. (June 30, 1890)	41,800
For increase of pay asked. (Submitted)	[illegible]
For furnishing and fitting gymnasium. (Submitted)	5,
For repairs to "Santee's" Wharf. (Submitted)	4,
For continuing grading and improvement of condemned property. (Submitted)	15,000.
Total	213,965.

B.

1.—*Salaries Hydrographic Office.*

Two clerks of class two (July 11, 1890)	2,800.
One clerk of class one (July 11, 1890)	1,200.
One assistant messenger (July 11, 1890)	720.
One watchman (July 11, 1890)	720.
Draughtsmen, engravers, assistants, nautical experts, computers, custodian of archives, copyists, copper plate printers, apprentices, laborers and helpers in the Hydrographic Office (July 11, 1890)	40,000.
Total	45,440.

II.—*Contingent and miscellaneous expenses.*

For purchase of copper plates, steel plates, chart paper, electrotyping copper plates, cleaning copper plates, tools, instruments, and materials for drawing, engraving, and printing; materials for and mounting charts; data for charts and sailing directions; reduction of charts by photography; photolithographing charts for immediate use, transfer of photolithographic and other charts to copper; care and repairs to printing presses, furniture, instruments, and tools; extra drawing and engraving; translating from foreign languages; expert marine, meteorological, and other work in the preparation of the Pilot Chart and supplements, and the printing and mailing of the same; and purchase of, compiling, and arranging data of charts, sailing directions, and other nautical publications; works and periodicals relating to hydrography, marine meteorology, navigation and surveying	33,0

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* This wharf, to which the ships of the Academy are moored, is in very bad co tion, and will soon be unsafe. Thorough repairs can not be made out of the cur appropriation. The amount asked for will put it in such condition that it can kept safe and fit for use for a long time by small annual repairs.

For rent of building for printing presses, draughtsmen and engravers, storage of copper plates, and materials used in the constructing and printing of charts, repairs and heating of the same, and for gas, water, and telephone rates	$1,500.00
For contingent expenses of branch offices, including furniture, fuel, light, rent, and care of offices, car fare and ferriage in visiting merchant vessels, freight, express, telegrams, and other necessary expenses incurred in collecting the latest information for the pilot chart, and other purposes for which the offices were established:	
Boston, Mass. (appropriated)	1,500.00
New York, N. Y. (appropriated)	5,500.00
Philadelphia, Pa. (appropriated)	1,800.00
Baltimore, Md. (appropriated)	600.00
Norfolk, Va. (appropriated)	800.00
Savannah, Ga. (appropriated)	800.00
New Orleans, La. (appropriated)	800.00
San Francisco, Cal. (appropriated)	3,200.00
Portland, Oregon (appropriated)	800.00
Portland, Me	1,200.00
Chicago, Ill	2,500.00
	54,000.00

The offices at Portland, Me., and Chicago, Ill., were established by the act of July 11, 1890, but as no money was appropriated these offices have not yet been established.

Port Townsend, Wash. (submitted)	1,500.00
Rent of New York office (submitted)	1,000.00
For continuing work on a series of charts of the coasts of Europe and Africa (submitted)	5,000.00
	61,500.00

FOR THE NAVAL SERVICE.

I.—*Gunnery Exercises.*

For prizes for excellence in gunnery exercises and target practice; for the establishment and maintenance of targets and ranges; for hiring established ranges, and for transportation to and from ranges, (the increase in this estimate is due to the first cost of ranges) (June 30, 1890)	10,000.00

II.—*Ocean and Lake Surveys.*

For ocean and lake surveys, the publication and care of the results thereof; the purchase of nautical books, charts and sailing directions, and freight and express charges on same; preparing and engraving on copper plates the surveys of the Mexican coasts, and the publication of a series of charts of the coasts of Central and South America (June 30, 1890)	14,000.00

III.—*Outfits for Naval Apprentices.*

For bounties for outfits of 750 naval apprentices at $45 each (March 1, 1889, and June 30, 1890)	33,750.00

IV.—*Transportation and Recruiting.*

For expenses of recruiting for the naval service; rent of rendezvous and expenses of maintaining the same; advertising for men and boys, and all other expenses attending the recruiting for the naval service, and for the transportation of enlisted men and boys at home and abroad (June 30, 1890)	30,000.00

V.—*Contingent, Navigation.*

For heating apparatus for receiving and training ships, and extra expenses thereof; for freight, telegraphing on public business, postage on letters sent abroad, stationery, ferriage, ice, apprehension of deserters and stragglers, continuous service certificates, good conduct badges, and medals for boys; school books for training-ships; packing boxes and materials, and other contingent expenses and emergencies arising under cognizance of the Bureau of Navigation, unforeseen and impossible to classify (June 30, 1890)	15,000.00

VI.—*Naval Training Station, Coaster's Harbor Island, R. I.*

For dredging channels, repairs to main causeway, roads and grounds, extending sea-wall, and the employment of such labor as may be necessary for the proper care and preservation of the same; for repairs and improvements on buildings, heating, lighting and furniture for same; books and stationery; freight and other contingent expenses; purchase of food and maintenance of live-stock and vehicles; repairs and attendance on same (the increase in this estimate is for coal heretofore furnished by other bureaus, for heating and lighting buildings occupied by the apprentices) (June 30, 1890)	$20,00
For extension of electric plant to accommodate the needs of station, duplicate of present dynamo and engine, small dynamo for night-lights, dynamo house, and wiring and lighting buildings Nos. 5, 6, and 10 (submitted)	3,00
	23,000.

VII.—*Naval War College and Torpedo School.*

For maintenance of the Naval War College and Torpedo School on Coaster's Harbor Island (June 30, 1890)	10,000.

RECAPITULATION.

FOR THE SUPPORT OF THE BUREAU OF NAVIGATION.

A.—I.	Salaries, Bureau of Navigation	33,120.
B.—I.	Salaries, Hydrographic Office	45,440.
B.—II.	Contingent and miscellaneous expenses	61,500.
	Total	140,060.

FOR THE NAVAL SERVICE.

I.	Gunnery exercises	10,
II.	Ocean and lake surveys	14,
III.	Outfits for naval apprentices	33,
IV.	Transportation and recruiting	30,
V.	Contingent, navigation	15
VI.	Naval Training Station, Coaster's Harbor Island, Rhode Island	
VII.	Naval War College and Torpedo Station	10,
VIII.	Naval Academy	213,
	Total	349,715.

NOTE.—The estimates for the support of the Office of Naval Intelligence, submitt on the 24th ultimo, are omitted from the estimates submitted herewith, in co quence of the Department's order of the 3d instant, transferring that office t office of the Secretary of the Navy.

REPORT

OF

THE BOARD OF VISITORS.

UNITED STATES NAVAL ACADEMY,
Annapolis, Md., June 6, 1890.

SIR: The Board convened on the 2d instant and organized by the election of Rear-Admiral L. A. Kimberly, U. S. Navy, president, and Senator J. C. S. Blackburn, vice-president. Lieut. R. Wainwright reported as secretary, having been detailed for that duty by the superintendent of the Academy. Hon. William A. Northcott was elected orator.

The various committees were then appointed by the president of the Board, and were requested to submit their reports as early as practicable.

The Board of Visitors beg leave to submit the following report as the result of its observations during its stay at the Naval Academy:

CONDITIONS OF ADMISSION TO AND DISCHARGE FROM THE ACADEMY.

The Board concurs in the recommendation made by previous Boards, that the age of admission be fixed from fifteen to eighteen years, instead of fifteen to twenty years as at present.

It is believed that comparative equality of age in the different classes would have a beneficial effect in the personnel of the classes, while wide discrepancy of age in the same class has a detrimental effect. Experience has developed the fact that the cadets entering between the ages of fifteen and eighteen exhibit the greatest adaptability to the service, and acquire the most proficiency in the course of study and training at the Academy.

For reasons which have been frequently urged the course should be fixed at the former limit of four years. The additional two years at sea are clearly a hardship and of no positive advantage to these cadets not desirous or able to enter the service, while, of course, they are of no benefit to those who remain in the service.

Furthermore, a reduction of the course will permit appointments to the Academy to be made every four years instead of every six years, and the benefits of the course will be extended one-third—a benefit not merely to the cadet but to the Government which educates him.

The appointment of a cadet should be made at least one year before he enters the Academy. This course has worked well at the Military

Academy. The new cadet will be better prepared to enter u duties and studies of the Academy, having this year to prepare for the work.

The Board is strongly of the opinion that all cadets should b residents of the districts from which they are appointed. The ments recommended by members must, under the present law actual residents of their districts. In case of a vacancy in any either by failure of the member to recommend, or from any other the law should compel the Secretary of the Navy in filling the to appoint an actual resident of the district. The advantage Academy should be widely diffused and every district, if possib be represented.

SUBJECTS OF STUDY AND STANDARD OF SCHOLARSHIP.

The Board find that the ground embraced in its examination gone over last year in the way of a series of questions and d before the Board of Visitors by gentlemen unusually well equippe such duty.

The desire was to know whether the entrance examination and sequent course of study were too severe. This has seemed to be a plexing question. There is much reason to doubt whether the p correspondence has been established between the preliminary exa tion and the subsequent courses of instruction from the fact th small a proportion of those admitted to the Academy succeed in at ing the standard prescribed for graduation.

In one recent year not as many as one-fourth of the number after examination completed the course. The sense of the A Board as made known to the Board is that something should be a to the preliminary examination, with a view of diminishing this disproportion between the number admitted and the meager n graduated.

It is suggested that some knowledge of geometry should be requ of the candidate; also something more comprehensive in the n of geography and history. The condition of common school ed in the country is such at this time that almost any village that will amply prepare a boy for this standard of examination.

If the law appointing cadets is so changed, as we conceive it sl be, so as to require a year's notice of a coming vacancy, ample would be given intending candidates to so prepare themselves fo mission as to make success reasonably sure.

It is believed that the cases are exceptional where a boy of mind, between the ages of fifteen to eighteen years, could not well the proposed requirements.

The Naval Academy should be so modeled as regards all its st or requirements as to secure the highest results to the blic Undue regard, therefore, should not be paid to political as its possibilities for increased usefulness are concerned. A n service is its great desideratum and, in these days when knc edge multiplied on every hand, an advanced standard of admissi sonably be demanded, so that this national school shall be other school in the older countries of the world.

GROUNDS, BUILDINGS AND SANITARY CONDITION.

The Academy grounds devoted to drilling purposes, as also and recreation privileges, are found to be in admirable condi equaled by few public-ground plots in the country.

The sanitary conditions seem and undoubtedly are excellent, as the general health of officers, professors, and students abundantly attest.

The building known as the students' quarters is inadequate in size and improperly and disadvantageously located, especially when the new or late acquisition of new grounds is taken into consideration.

It is not only insufficient in capacity and situated at too great a distance from the recitation-rooms, but will stand as an obstruction between the present campus and the additional grounds lately acquired, which grounds will be the outlet of the future to the grounds and cemetery beyond, or north of the river. Addition to the building would but render these quarters a still greater obstruction.

The unused hospital building should, the Board is convinced, be sold or otherwise disposed of as heretofore recommended by the Boards of Visitors for the years 1888 and 1889.

Referring to the recommendation urged last year for the erection of additional houses for officers detailed as instructors, we are impressed with the necessity of prompt action at least for four new double quarters, and that Congress should provide quarters for all officers stationed at the Naval Academy.

It is the judgment of the Board, in the absence of a survey made by experts, that the recitation hall should be replaced by a safe building, or the present hall thoroughly repaired, it being in a seemingly unsafe state.

SEAMANSHIP, ORDNANCE, AND NAVIGATION.

The Board has carefully and with much interest observed the target practice with great guns, and the drills in seamanship on Board of the *Wyoming*.

In those exercises the ship was under way in the bay; the cadets worked the ship under sail and steam, performing all the duties that would be required of a crew on board of a regular cruising vessel at sea.

The exercises of sails and light-yards were fairly well done, considering the opportunities they have had, and also taking into consideration the fact that the *Wyoming* is too heavy a ship in all respects to be used as a practice vessel.

In witnessing the exercises referred to the Board is convinced that a smaller and lighter vessel and proportionally rigged and armed with the latest type of guns and supplied in other respects with the improved fitments that are required and necessary to bring the ship up to the most perfect point of efficiency should be furnished the Academy with as little delay as possible.

The department of ordnance is efficiently conducted, as shown by the exercises and target practice on board the *Wyoming;* they were particularly good, and met with high commendation from the Board. The distance from the target to the ship was, on the average, about 1,000 yards; the target was totally destroyed, and but very few of the shots fired would have missed a moderate sized vessel. The guns' crews were cool and deliberate in working their battery, and showed a proficiency and excellence in their management that reflected great credit on their instructors and themselves, especially as some of the guns fired in this target practice were the old style 32-pounder, smooth-bores, mounted on the broad side Marsilly carriage.

The drill of the field pieces on shore was very good, and the cadets manipulated their pieces and maneuvered them with an ease and rapidity that was especially gratifying.

The exercise in fencing, the bayonet drill, the setting up and cane drills, showed the cadets to be proficient in the use of the rapier, and bayonet, and this proficiency was a mark of their interest in of these weapons.

The examples placed before the Board in navigation leads it clude that the cadets understand thoroughly its principles and t plication on all points necessary to become expert navigators.

In view of the fact that the torpedo service promises to important branch of naval warfare, the Board recommends t pedo-boat be stationed at the Academy for the practical instru the cadets.

DISCIPLINE, DRILL, PRACTICAL EXERCISES, ADMINISTRATION, POLICE.

The discipline of the Academy is worthy of the highest co tion, the rules established being only such as are necessary to proper training of the cadets, and enforced with firmness and ation; and the most kindly relations exist between the o en cadets.

The orders issued January 20 and 25 last by the superint st, tablishing the department of discipline, are especially to be comm By these orders the various offenses are properly graded as to ments, those offenses affecting the character of the offender very properly, more severely dealt with than offenses merely indi thoughtlessness.

Furthermore, while heretofore adequate punishment has be vided for offenses, no adequate recognition has been given to goo duct, efficiency, and attention to duty. By the orders issued as this has been corrected and cadets are properly credited for th itorious behavior.

The Board has been especially gratified at the evidences of tho training of the cadets in drill and tactical evolutions, as evide the numerous and varied drills in the presence of the Board.

In this connection it approves of the act of the superint offering medals for proficiency in great-gun target practice an arm target practice; the beneficial effect thereof is already ap in the improvement of the cadets in this branch of their work.

The commissioned officers stationed at the Academy are to be mended for establishing by their contributions a permanent f procure a medal annually for general excellence in athletic exer The supervision of all drills, as well as the enforcement of the r discipline, devolves upon the commandant of cadets, and the recommends that he receive the highest pay of his rank, shore pay, which he now receives.

It is recommended that the cadets be relieved from the pay the wages of the servants employed about their quarters, such a c not being imposed upon students in other institutions.

The Board finds that the police force of the Academy is ample number, but by an apparent anomaly can not exercise ordinary power for arresting offenders on Government grounds, and the recommends that proper legislation be enacted by Congr s g these officers, under proper restriction, the power of arrest tion possessed by similar officers under State law.

STEAM, MATHEMATICS, PHYSICS, AND MECHA

The work-shops and tools in the department of st appears to be ample in quality and quantity for purp of

e methods of adjusting and constructing the metal portion of ma-
ery in use upon and about the war vessels of our Navy; there seems
e, however, an absence of proper machinery in the wood-working
rtment for the thorough instruction of the cadets.
e smith forges have been supplied with a long needed power
t during the past year, and are in good order. The antiquated
-valve double cylinder engine used for instruction in steam-engi-
ing should, in the opinion of the Board, be supplanted by a triple-
nsion condensing engine of modern and approved construction, such
re now in use in the Navy Department, but of a smaller size than
resent slide-valve engine, and that the propeller wheel be submerged
water tank—to cost about $50,000—in such a manner that the prac-
workings may be observed and accurate measurements of speed,
nce, and power be obtained.
e course in mathematics is of a sufficiently high standard, and the
ts are well instructed in this important branch, so necessary in the
y of naval engineering.
the department of physics many improvements have been made,
cially in the line of electrical appliances, and while the plant seems
le for instruction in the rudiments of electrical lighting and other
ches of electrical science, the system might be extended, the
d thinks, with advantage to the lighting plant of the Academy,
eby preventing to a great extent the cause of failure of a number
e cadets by the overtaxing of the eye-sight by the use of other
ems of artificial lighting.

LISH STUDIES, MODERN LANGUAGES, DRAWING, PHYSIOLOGY, AND HYGIENE.

e fullest opportunity was allowed the Board to intelligently inquire
the methods of study in the above departments.
instruction given in English studies and modern languages was
ed by thoroughness and detail, all advanced methods being em-
, while the teaching of drawing and physiology and hygiene was
mplete and satisfactory as to leave nothing for the Board by way
ggestion or criticism.
yond a doubt the course of study will favorably compare with
of the best educational institutions of the country, thus supply-
n admirable equipment to its graduates for honorable service in
capacity to which they may be called.

FINANCE AND LIBRARY.

ter conferring with the officers and clerks of the various depart-
ts of finance represented by the storekeeper, commissary, and cadet's
keeper, and a thorough examination of the methods of keeping the
ral accounts, the Board has arrived at the conclusion that the pay-
er division of the Academy is well administered, and that the sys-
of approval by various officers and of audits and checks by the mem-
of the audit committee are good and sufficient to guard the finances
e institution.
inspection of the library and interviews with the librarian show
the building is well adapted for the purpose for which it is used,
ooks well arranged and systematically cared for, and if it were not
he restrictions of the law requiring that the pamphlets, magazines,
rebound books shall be bound in ordinary cloth or "half-roan," the

arrangement of the books upon the shelving would conform to th
eral appearance of a well conducted and maintained reference libr

It is, therefore, recommended that the suggestions of a former
be carried out and that the library of the Naval Academy be e
from the restrictions of the law and be added to the list of lib
that are not restricted in the character of binding.

The Board was most favorable impressed with the efficient
cer-like manner in which all that relates to the discipline and
condition of the institution has been conducted and pursued b
superintendent, Capt. Wm. T. Sampson, and his very effective
and embodies its sense of this matter in this report.

Very respectfully, your obedient servants,

L. A. Kimberly, *Rear-Admiral, U. S. Na*
J. C. S. Blackburn, *U. S. Senate.*
Eugene Hale, *U. S. Senate.*
C. A. Boutelle, *M. C.*
William C. Wallace, *M. C.*
Harry Welles Rusk, *M. C.*
M. M. Murdock.
Wm. A. Northcott.
W. H. Elliott.
J. H. Gallinger,
W. Stuart Walcott.
A. W. Campbell.

Hon. B. F. Tracy,
Secretary of the Navy.

REPORT

OF

THE CHIEF OF THE BUREAU OF ORDNANCE.

BUREAU OF ORDNANCE, NAVY DEPARTMENT,
Washington City, October 15, 1890.

IR: I have the honor to submit the annual report of this Bureau,
also to transmit estimates for the fiscal year ending June 30, 1892:

Fuel, tools, material, and labor; proof of naval armaments; expenses of target practice on the new vessels of the Navy; removal of the magazine at Craney Island to a more suitable locality, and new magazine at Sitka, Alaska	$265,000.00
For a reserve supply of projectiles	60,000.00
General repairs to ordnance buildings, machinery, magazines, and appendages	40,000.00
Freight and miscellaneous expenses	10,000.00
Civil establishment at navy-yards	30,041.25
General expenses of the Torpedo Station	75,000.00
Towards the armament of vessels authorized	4,158,850.00
Total	4,638,891.25

BREECH-LOADING GUNS.

he general system of manufacture and construction developed by
predecessor in the Bureau, Capt. Montgomery Sicard, U. S. Navy,
been adhered to, and it should be appreciated that it is due to his
e, wise, and painstaking efforts, that the Department is at present
position to proceed with confidence and energy with the rapid and
cient armament of the modern war vessels, the construction of which
been authorized by legislation.

he following table gives the number of sets of forgings thus far or-
ed, the number of guns completed to date, and the number in course
onstruction at the Washington gun factory, forgings for which have
n delivered.

Caliber.	No. of sets of forgings ordered.	No. of guns completed.	No. in course of construction, forgings for which have been delivered.
4-inch	35	4	12
5-inch	4	2	
6-inch	128	77	25
8-inch	35	15	2
10-inch	25	4	3
12-inch	8		
13-inch	12		

A 13-inch gun of 35 calibers has been designed, and to manufacture are in course of construction at the naval gun ory.

The Bureau has not yet received any forgings of this size entered into contract with the Bethlehem Iron Company for sets for the batteries of the three battle-ships authorized by the Congress approved June 30, 1890.

It is thought that this will be the largest gun ever likely t needed for naval purposes.

It will be found figured in the appendix.

Forgings for the 12-inch caliber will soon be received from the lehem Iron Company, and all preparations have been made to p rapidly with their manufacture at the Washington navy-yard.

The forgings for the fourth gun of the *Miantonomoh* and three 10 inch guns of the *Maine* have been received and are in manufacture at the gun factory.

The Bureau has endeavored to adopt hand-power to the closing system of the larger calibers, notably 10 and 12 inch, manufactured a type design adopted from a French invention, ou definitely adopted a system proposed by Ensign Dashiell, at of the Bureau, which possesses much merit. A sketch of will be found in the appendix.

Six 8-inch guns of 35 calibers, of the design mentioned reau's report of last year, have been manufactured, and are enun in the list of guns completed. They have been thoroughly te Annapolis, and have furnished 2,100 foot-seconds initial velocity. 15-tons pressure, the limit fixed by the Bureau, and with the st projectile of 250-pounds.

Four of these guns have been issued to, and mounted upon, the *timore*, and two will be mounted upon the *Charleston* in place of of her 6-inch guns, on her return to the United States.

The Bureau has designed an 8-inch gun of 40 calibers, wh t in compliance with the suggestion of the Secretary of the Navy, n poses to mount upon the 5,300-ton cruiser, known as cruiser No. 6. will be found figured in the appendix.

It will be readily feasible to manuever this gun upon the impro carriage by hand-power, a desirable feature; and the flat t due to the extremely high velocity which can be imparted to t jectile of this piece, will render it practicable to use it at the o battle range without measurement of distance.

The contracts with the West Point Foundry, Cold Spring, N. Y. the South Boston Iron Works, Boston, Mass., for the manuf ure 6-inch guns, have been completed, and the guns have been prov issued to the service.

The Bureau has not made any further contracts with private for work of this character, the capacity of the gun factory at the W ington navy-yard being more than sufficient to handle forgings fast as received from the Bethlehem Iron Company, South Bethle Pa., and the Midvale Steel Company, of Nicetown, Philadelphia, r the domestic sources of supply of steel forgings.

The Bureau contemplates issuing 6-inch guns of 35 cali to all of the fast cruisers authorized by the naval appropriation approved March 2, 1889, and June 30, 1890, and proposes to ake more contracts for forgings for 6-inch guns of 30 calibers in leng

A single example of this length of bore has been n tur tested at Annapolis. Its performance was satisfactory, ay

,100 foot seconds, with a pressure of 15 tons having been obtained. It ill be found figured in the appendix.

A 6-inch gun of 40 calibers length of bore, which will be found figured the appendix, has also been designed, and forgings for two of this ngth have been ordered.

It is not considered that the rapid-firing feature, that is to say, fixed mmunition, cartridge-case, charge, and projectile in one, should be dopted for this caliber on account of the excessive weight when so onstructed, and it is not believed that this caliber of the quick-firing ariety has been entirely successful abroad.

The Bureau has commenced the manufacture of 4-inch and 5-inch id-fire guns, of 40 calibers length of bore, and a number of forgings each have been ordered.

Two types of 4 inch guns, differing in the breech closure, have been nufactured, one having the ordinary interrupted screw breech plug the other the Driggs-Schroeder block, so called from its inventors.

The 4-inch Driggs-Schroeder breech mechanism will be found figured the appendix.

specimen of the ordinary type has been fired forty-five rounds at naval ordnance proving ground, Annapolis, Md., in the develop- of its powder and in the test of its carriage, and has furnished a ocity of about 2,000 foot-seconds with a pressure of about 14 tons, a arge of 14 pounds and a projectile of 36 pounds.

This result is extremely satisfactory, but is not final, as the condi- ns of the charge have not yet been fixed.

It is proposed that the combined weight of the cartridge-case, charge, projectile [illegible] the 5-inch rapid-fire gun shall be not more than 100 unds, which weight, it is anticipated, can be handled without diffi- lty. It is intended that the projectile shall weigh 50 pounds, the ge between 25 and 30 pounds. This relation, with the notable h of bore, should give excellent ballastic qualities, and the Bureau poses that this shall be, after suitable tests, the *standard* quick-firing e of large caliber. This should make a desirable piece to mount in me of emergency on board merchant vessels that may be acquired by Department for war purposes, and an item has been inserted in the imates for the next fiscal year for an amount sufficient to manufact- e twenty-five of these pieces to hold in store. A drawing of this ype will be found in the appendix.

A number of designs have been presented for the breech closures of calibers under 8 inches, with the object of increasing rapidity of e by opening and closing the breech by a single movement.

Of these the Bureau proposes to adopt for the 5-inch caliber after uitable test the design of Ensign R. B. Dashiell, and if found success- ul it will also be applied to the 6-inch caliber. It will be found figured in the appendix.

Another design presented by Lieut. Samuel Seabury, U. S. Navy, also offers features of advantage.

The adoption of rapid-fire guns of large calibers rendered it necessary to develop a plant for the manufacture of brass cartridge-cases for them, and, after some negotiations, an agreement was reached with the Winchester Repeating Arms Company, of New Haven, Conn., to supply 15,000 4-inch cases with an option to the Department to order 10,000 more at a reduced price.

The company has nearly completed the installation of machinery capable of making cases of the largest size ever likely to be required, and the delivery of the 4-inch cases will soon commence. Th will be found figured in the appendix.

It is proposed to substitute for the short 3-inch rifle, her issued to the service as a boat gun or for purposes of dis with a naval force, a 6-pounder rapid-firing piece of r ballastic power, and to use the same projectile as is a ed Hotchkiss and Driggs-Schroeder 6-pounder high-powered rapi gun, reducing the charge by an amount which will limit the viol recoil of the piece to the capacity of an ordinary field carri ammunition will be fixed.

It is believed that this piece will have a certain merit as field lery, its projectile having perhaps equal mining power with that 3-inch gun which it replaces, and greatly increased range and ac A greater number of rounds can also be carried in the same bulk when disembarked.

Five forgings for this caliber have been ordered and are in pr manufacture at the Washington navy-yard.

A satisfactory field-carriage has been designed for this piece Bureau.

This gun and its carriage will be found figured in the appendix.

The 1-pounder rapid-firing piece heretofore issued to the servic been considered to leave much to be desired in design, having cient ballistic power and furnishing an extremely violent rec Bureau has therefore had designed a piece 40 calibers in len weighing about 100 pounds, which it proposes to substitute for th 1-pounder as fast as may be, and has ordered fifteen of these piec the Driggs-Schroeder system of breech-closure. It is believed tha piece, which will be found figured in the appendix, should take the of the 37^{mm} revolver cannon, the latter being unwieldy and difficu maneuver in rapid pointing.

It is assumed that three of these pieces will have equal rap fire with the five barrels of the cluster, and their distribution at ent points will be a more effective arrangement in action.

For the present the ammunition of the new piece will be that of 37^{mm} revolver cannon and the old model single-barreled 1-pounder

The Bureau desires to have recognized the valuable services of Philip R. Alger in the development of naval-ordnance construction.

MORTAR.

In connection with the use of high explosives, which the always considered should be used from a powder gun in naval tions, the Bureau has designed a piece which may be called a mortar, although its length is somewhat greater than that given to the mortar. It is proposed in this piece to project a ch 100 pounds of high explosive. A sketch of the gun will be fou the appendix.

It is intended that this piece shall be mounted on board of vessels, as the ram, which are intended to fight at close quarters.

SUBMARINE GUN.

The act of Congress approved June 30, 1890, appropr ed for the purpose of enabling the Secretary of the Navy to and experimentally test, under rules and conditions to by him, a submarine gun and projectiles for the same, with io part of this money should be expended until the owners of the ts to be tested should agree by contract to give the Government otion, within a specified time, to contract, at such price as shall be actory to the Secretary of the Navy, for the exclusive right on the of the Government to manufacture, by contract or otherwise, such arine guns and projectiles without payment of any royalty on the

accordance with the above-mentioned act of Congress, the Navy rtment has, under date of the 19th of September, 1890, entered contract with the Ericsson Coast Defense Company for one sub le gun and six steel projectiles for the same, said gun and project- be placed, fixed, and secured in position on board the steam-ves- iown as the *Destroyer*.

s proposed to make a thorough test of this system of submarine ery, which possesses undeniable advantages, if applied to special of vessels, such as the ram designed for work at close quarters.

e experiments will be conducted at the Torpedo Station, Newport,

HURST REINFORCE CARTRIDGE AND ARMS.

preliminary agreement has been reached with the Hurst Reinforce idge and Arms Company, under which the company may present e Department for test one 1-pounder, one 3-pounder, and one under Hurst rapid-fire guns with one hundred cartridges for the actual cost of manufacture of said guns and ammunition to be for by the Department out of the appropriation of $50,000 made e act of August 3, 1886. Should these guns give certain stipu- results, the Department has the option of purchasing for the rnment the exclusive right to their manufacture for a stated

STEEL CAST GUNS.

e 6-inch open-hearth steel cast gun, manufactured by the Standard Casting Company, of Thurlow, Pa., and of which the first trial was led in last year's report, was, at the request of the company, sub- d to a further test in April, 1890. This second test consisted of a ition of the original test of ten rounds with service charge and ctile. The result was that the permanent extension of the bore o the first trial was about doubled near the seat of the projectile, in enlargement was produced all the way to the muzzle. The flaws ted after the first trial were also observed to be somewhat ex- d.

e gun was therefore finally rejected.

POWDER.

e manufacture of brown powder for the naval service has continued essrs. E. I. Dupont & Co., of Wilmington, Del.

e powder for the 6-inch B. L. R. has been produced by them with rm success, in advance of the demand for it for the new ships. In 0-caliber gun the requirements have been maintained at a muzzle ity of 2,000 foot-seconds to the 100-pound shell with a pressure tons. In the 35-caliber gun a muzzle velocity of 2,100 foot-seconds tained with practically the same pressure.

merous samples of brown powder for the 8-inch B. L. R. have been d, and a lot of 20,000 pounds was accepted as a partial allowance for the *Baltimore*, and for ranging the gun. Later samples of p for this gun have given much better results, and there does not to be any difficulty in obtaining with the 35-caliber gun a muz ity of 2,100 foot-seconds with a pressure of about 15 tons. results have also been obtained with brown powder in the 10- R. A lot of 10,000 pounds has been accepted, which giv a velocity of 2,000 foot-seconds in the 30-caliber gun, with a pr about 15 tons. Other samples have done better. These result considered as extremely gratifying, being, with the same weight o jectile and a charge of from 5 to 10 pounds less according to from 2½ to 3 tons less in pressure and about 50 foot seconds gr muzzle velocity than obtained in service abroad with brown po

Samples of brown sphero-hexagonal and cubical powder hav tried in the 4-inch B. L. R., but better results have been obtai the 6-inch grain in this gun. Further experiments will an increased capacity of chamber or cartridge case, when it is e from the results already obtained that there will be no difficult taining a muzzle velocity of 2,000 foot-seconds with the 36-poun and a charge of about one-third with a pressure of less than 1 A lighter shell may be used.

Arrangements have been made with Messrs. Dupont & Co. fo manufacture of brown powder of a new and smaller form grain for the 5-inch and 4-inch R. F. guns, better adapted tridge-cases of these calibers.

The manufacture of cubical black powder for filling the 3 pounder cartridge-cases of the Driggs-Schroeder and Hotch is continued by Messrs. Dupont & Co. The powder for t no longer identical, better results being obtained with a sepa der for each caliber.

During the year Messrs. Dupont & Co. have, at the suggest the Bureau, acquired the rights in the United States of the Chi Company of England, those of the United German Factories the Wetteren Company in Belgium, and are thus in a position t ufacture brown powders of the same qualities as are furnished pean Governments, should it prove desirable.

Considerable prominence has been given abroad to the use of called smokeless powders in rapid firing guns, and, in a more extent, their use in the larger calibers. None of these powders been as yet definitely adopted by foreign governments, and it able that some time will have elapsed before they are issued fo on board ship.

For small-arms a number of successful experiments have b ported by our attachés and in the public press, but the Bureau heard of the definite adoption and use of smokeless powder for arms except in France, where the secret of its manufacture has well guarded.

The Bureau considers that it will be the part of wisdom to more definite action in this direction in Europe before committing to any of the powders thus far suggested. The question of st in store is so important that, since the Department possesses ex powder of the older varieties, it can afford to await until time periment will throw more light upon the subject. In the mean the results obtained abroad and all experiments are closely obs and noted, and samples are tested and analyzed as fast rece The Bureau proposes to be able at a given moment, wl domesticate in this country the manufacture of smokeless

HIGH EXPLOSIVES.

g the year the Bureau has had numerous experiments carried
taneously at the torpedo station and at the naval ordnance prov-
ind with Emmensite, a high explosive invented by Prof. S. H.
s.

eports from both stations have shown that this material has an
e force about equal to that of gun-cotton. It is insensitive to
and impact of projectiles, and only locally ignited by flame, the
ion ceasing when the flame is removed. It is practically unaf-
y large changes of temperature, is uninjured by freezing and
, and loses but little strength even after repeated saturations
ter and drying. It is capable of explosion by a gunpowder
en strongly confined, giving an explosion which approaches
on.

h explosive which can be detonated without the use of fulmi-
uld be peculiarly valuable for ordnance purposes, and the Bu-
l therefore continue the experimental investigation and trial of
site.

COMMON SHELL.

on shell and shrapnel of cast iron up to 10-inch in caliber have
anufactured at the Washington navy yard and supplied to the
s as fast as needed.

on shell of cast-steel, while possessing the advantage of con-
much larger bursting charges, have not proved altogether sat-
on trial, and for the present their manufacture has been dis-
d.

ureau has long since desired to develop in this country a pro-
orging common shell of steel which has been in use for some
oad, and which possesses marked advantage in the feature of
unt of the mining charge carried over that presented in cast-
jectiles.

recently entered into negotiation with an American firm which
ired the right to manufacture under one of these processes,
patented, and expects shortly to have specimens up to 6-inch
er for test, and that this valuable manufacture will thus be
y established in the United States. It will be found to be es-
desirable for the rapid fire guns of 4 and 5 inch in caliber.

ARMOR-PIERCING PROJECTILES.

iments have continued in the development of metal and temper
for armor-piercing projectiles. A number of private firms in
ntry have furnished specimens of the 6-inch caliber, tempered
cases by their own processes and in others by methods sug-
y the Bureau or the Washington Gun Factory. None of these,
, have been sufficiently successful thus far to warrant serious
n the part of the Bureau. It became necessary therefore to
one of the well-known French methods, namely, the Holtzer or
, which have been generally adopted in Europe.

ures were made to the owners of these processes, which are
ith the result (the price of the Holtzer being found excessive)
acquisition through an American firm, the Carpenter Steel
y, of Reading, Pa., of the Firminy process improved, as it is
by Messrs. Firth & Sons, of Sheffield, England, and a con-
s made with the Carpenter Steel Company, involving the
of $200,000 for projectiles of calibers from 6 to 12 inch inclusive.
ens of this manufacture will be presented for test within a

short time, and it may be anticipated that the Bureau has th at a solution of this difficult question.

It being desirable, however, to acquire the Holtzer proc the Bureau has instituted measures leading to such acquisit is anticipated that within a few months both methods will be disposal of the Department.

The Bureau's designs of armor-piercing projectiles will be ured in the appendix.

MOUNTS FOR MAIN BATTERIES.

The mount for the 4-inch rapid-fire gun mentioned in the has been completed and tested with satisfactory results, and a mount for the 5-inch rapid-fire gun has been designed. These are of the same type which has been successfully used for the s battery guns, and being on anti-frictional bearings they enable operator to point and fire from the shoulder 4 and 5 inch guns same facility as 3 and 6 pounders.

The 5-inch mount and a similar design for a 6-inch gun-carri shown in the appendix. All the carriages are so arranged that motors can be applied to them if it be found desirable.

The manufacture of 6-inch central pivot carriages has con the lines as developed by my predecessor and they have giv satisfaction. The adoption of a single steel casting for the improvements in methods of manufacture have reduced the cost of these carriages from $6,556 to $2,824.

The 8-inch central pivot carriages of the *Baltimore* and have been completed and tested, and they give complete sa

The 8-inch guns of the *Chicago* and *Baltimore* have been work easily and well by hand, but the Bureau considers it d develop the application of electricty to the handling of gu contracted with the Edison Electric Company and the Thom ton Company for motors to be applied to an 8-inch gun carri to control all the motions of the gun.

The 8-inch guns of cruiser No. 6 (5,300 tons), armored crui (8,100 tons), and the battle-ships are to be mounted in turrets a proposed to use electric power for handling them. The 8-inch mount for cruiser No. 6 is shown in the appendix; that for cr 2 and the battle-ships will be of the same type as is adopted 10-inch guns of the monitors.

The detail designs of the 10-inch mounts for the *Amphitrite, M nock, Maine,* and *Monterey* have been completed and their const has been begun.

The 12-inch mounts for the *Puritan, Texas,* and *Monterey* are of lar design and their construction has also been commenced.

The drawings of the 13-inch gun mounts for the new battle-ship being prepared. They are of the same type as the 10 and 12 mounts which are shown in the appendix.

The Bureau desires to commend the able work of Lieut. A. McC in the development and elaboration of the designs of the mounts o heavy guns of main batteries.

SECONDARY BATTERIES.

The Hotchkiss Ordnance Company has filled its original c with the Department for ninety-four Hotchkiss guns and for tion for them, with the exception of steel shell for 6 and 3 p the manufacture of which, of the proper quality, considerable has been experienced.

ldition the company has delivered under subsequent orders the
ng articles: 3-pounders, 5; 1-pounders, 2; 37^{mm} revolving can-
.

Driggs Ordnance Company has begun work on the ten 6-pounder
ı 3-pounder guns ordered last year, and also on the ammunition
m. The guns are being constructed by Colt's Patent Fire-Arms
ıcturing Company, of Hartford, Conn., and the ammunition by
ion Metallic Cartridge Company, of Bridgeport, Conn.

ırder has recently been given to the same company for fifteen
ower 1-pounder trunnionless guns.

competitive trial of 1-pounder ammunition, held at the Naval
ıce Proving Ground, Annapolis, Md., in June last, in which the
kiss and Driggs Ordnance Companies were competitors, the first
company was successful, and received an order for 20,000 rounds.
pounder field gun has been designed and forgings ordered for its
ıcture. Its breech mechanism will be of the Driggs-Schroeder

recoil mounts for 3 and 6 pounder guns with automatic return
ed by Lieut. F. F. Fletcher, U. S. Navy, have been improved by
ıd have been supplied to all new vessels fitted out within the
A similar mount for the new high-power 1-pounder guns has
esigned by him and is in process of manufacture. The Bureau
to mention particularly the excellent services of this officer.
ese mounts will be found figured in the appendix. A cast-steel
or the 1-pounder has been designed and found much lighter than
cone mount; it is figured in the appendix.

efore stated, the Bureau proposes to limit the small rapid-firing
to the 6-pounder and the 1-pounder calibers, and to abandon as
advantageous the 3-pounder quick-firing pieces, the 47^{mm} and
^{m} revolvers.

negotiations with the Maxim-Nordenfeldt Guns and Ammunition
ny for the purchase of a number of musket-caliber and 1-pounder
ıtic guns, which were in progress at the date of the last report,
ot concluded, owing to unsatisfactory reports from abroad con-
g the financial condition of the company and the performance of
ns. The Bureau, has, however, ordered one automatic musket-
gun from that company for the purpose of carrying on proposed
ive experiments with smokeless powders.

Bureau has recommended the following changes to be made in
ondary batteries of the vessels now in course of construction:

Vessel.	Present secondary battery.					Proposed secondary battery.			
	6-pounder.	3-pounder.	1-pounder.	37^{mm}	Gatling.	6-pounder.	1-pounder.	Gatling.	37^{mm}
No. 5 (1,000 tons)	......	2	1	2	2	4	2	2	......
No. 6 (1,000 tons)	......	2	1	2	2	4	2	2	......
o. 6 (5,300 tons)	8	6	2	4	4	14	6	4	......
o. 7 (3,000 tons)	2	2	1	2	2	8	4	2	......
o. 8 (3,000 tons)	2	2	1	2	2	8	4	2	......
o. 9 (2,000 tons)	2	2	1	2	2	6	2	2	......
o. 10 (2,000 tons)	2	2	1	2	2	6	2	2	......
o. 11 (2,000 tons)	2	2	1	2	2	6	2	2	......
	4	8	2	4	4	12	6	4	......
cruiser No. 2	4	4	4	4	4	12	2	4	......
	4	8	4	4	2	12	4	2	4
	4	2	2	4	2	6	4	2	......

MACHINE GUNS AND SMALL-ARMS.

Nothing has been done with regard to procuring machine small-arms, as the Bureau is awaiting the settlement of the caliber by the ordnance department of the Army, it being e desirable that both branches of the service should use the tridge.

It can not be claimed that the results thus far obtained wi small caliber rifle and with smokeless powder have been found entirely satisfactory in any European country. The most pe favorable results are reported from France, where the powde have been well guarded, but there are reports of failures fr as well.

It seems fairly probable that the abrupt change in Europea to the small caliber, now almost universally adopted, was made complete justification. The ballistic results, using brown po a perforated cartridge with the small caliber, were not satisfac question of fouling entering to a disastrous extent. It then bec essary to adopt one of the nitro-explosives in order to use caliber bullet. This was demanded as much for its non-fouling as for the smokeless feature.

The Bureau is reliably informed that several European countri now to a certain extent provided with small caliber rifles in w can not use the brown or black varities of powder on accoun fouling, and for which they have not yet been able to obtain a tory smokeless non-fouling variety.

It is believed that in most cases the reduction of caliber has great, and that this should not go below .32.

It will therefore seem to be the part of wisdom to delay for watching carefully the results obtained abroad, the definite a of any small caliber. In the meantime all the private factorie country, as well as the Bureau, are closely observing European and experimenting with domestic and foreign samples where tl nish definite evidence of advantage.

A .45 caliber Gatling, model 1884, has been fitted experimentally a small electric motor, as a substitute for hand power in tu firing crank. The preliminary tests of this device have shown rate of firing of the Gatling can be thereby increased to upwards thousand rounds per minute, while the advantages in increased ness and regularity of fire are very marked.

A tripod stand for the Gatling gun has been designed and found figured in the appendix.

The Colt's Arms Company, of Hartford, Conn., has complete delivery of the five thousand revolvers ordered.

PRIMERS AND FUSES.

The difficulty of manufacturing a successful electric primer small size adopted for the service has induced the Bureau to co the advisability of increasing the interior diameter of the st primer, retaining, however, its general form. A new and simple attachment has been devised for use with the new primer, and if thorough trial both prove satisfactory they will be adopted ually replace those in present use. This change will involve alteration in the mushrooms of guns already issued to service.

The new attachment and primers will be found figured in the

Experiments with a base fuse have continued, and a form which romises well will shortly be submitted to final tests.

Fuses of several forms have been devised for use with shells loaded ith high explosives, and the experiments thus far made indicate the eedy development of a means of detonating high explosives on im-act, while assuring safety from explosion due to shocks of firing from owder guns.

THE HOWELL TORPEDO.

The Hotchkiss Ordnance Company has not yet presented a torpedo or official trial, as required by the terms of the specifications of the ontract dated January 5, 1889, owing to the loss of two torpedoes at reliminary trials by the company and to difficulties met with in devel-ping the weapon. An extension of the contract time for delivery has een granted by the Department, and the contractors expect to be ready or the official trial and to deliver the torpedoes contracted for by the lst of January next.

The 10 launching apparatuses ordered are practically completed and await the completion of a torpedo for official trial.

THE WHITEHEAD TORPEDO.

The Department having been placed in a disadvantageous position with regard to the supply of torpedoes for the vessels completed and in course of construction on account of the failure of the Hotchkiss Ordnance Company to present a successful specimen of the Howell torpedo, the Bureau instituted correspondence with the Whitehead Torpedo Company, of Fiume, Austria, with the view of adoption in this country of the torpedo of their manufacture. Favorable terms have been obtained, and an order will shortly be placed with a reputable American firm for a number of them.

It is the Bureau's intention to make competitive tests and trials of this torpedo with the Howell, and definitely adopt for service uses one or both of these.

THE PATRICK TORPEDO.

One of the three torpedoes ordered February 26, 1889, from Mr J. N. H. Patrick, and referred to in the last report, has been submitted to test and found to fulfill the requirements of the contract. The other two have been manufactured and will be accepted on passing the required tests. The report of the trial board will be found in the appendix.

It is proposed to use these torpedoes, as originally intended by the Department, for instructional purposes, in connection with the War College at Newport, R. I.

In this connection the bureau desires to recommend the advantages which would accrue to the Department from its acquisition of the whole of the torpedo-defense system, a portion of which is at present controlled by the Engineering Department of the Army.

THE HALL TORPEDO.

The act of Congress approved June 30, 1890, appropriated $20,000 for the purpose of testing torpedoes, and the Bureau proposes to develop under this appropriation the design of Lieut. M. E. Hall, U. S. Navy, which possesses merit.

It is of the automobile system and differs but slightly Whitehead type. One of these will be manufactured from the furnished by the inventor at the torpedo station, Newport, R. I.

TORPEDO DEFENSE NETS.

Steps have been taken to arrange for the manufacture in t try of a steel wire netting, which, while strong enough to stop mobile torpedoes, shall be light and flexible. Samples are now made for several different designs, which will soon be ready and it is thought that at least one will be found to fulfill the conditions.

It is the intention of the Bureau to recommend that only vessels shall be supplied with these nets.

TORPEDO BOAT.

The steel sea-going torpedo boat provided for by act of Con proved August 3, 1886, has been completed by the Herresh facturing Company, of Bristol, R. I., and, having been submitte on March 31, 1890, before a board of which Commander T. F. J U. S. Navy, was senior member and proved complete and satisfa according to the contract requirements and conditions, has be cepted. This boat, which has been named the *Cushing*, has develo speed of about 26 knots and is considered in all respects satisfa Her armament will consist of three 1-pounder guns and three to tubes.

The report of the board ordered to conduct the trials of this v appended.

The Bureau has considered that it will be advantageous to th partment to transfer the construction of all torpedo boats to the B of Construction and Repair, which recommendation has received t proval of the Department.

ARMAMENT OF THE NEW VESSELS.

Since last report the armaments of the *Baltimore*, *Philadelphi* *San Francisco* have been completed and installed, and the batte the *Newark* and *Concord* completed and are ready for installatio

It is considered that the value of the *Concord* class would creased by the substitution of a larger number of rapid-fire gu the six 6-inch guns now constituting the main batteries. Accor the Department has decided to arm the *Bennington* with eight R. F. guns, and their construction and installation will be pus rapidly as possible.

The 8-inch guns and carriages of the *Charleston* have also bee pleted and will replace four of her 6-inch guns on her return United States.

The forgings for the fourth 10-inch gun of the *Miantonomoh* finally been received and the battery of that ship will soon b pletely installed.

The Department having decided to replace the 16-inch gun *Monterey* by two 12-inch guns, and the 12-inch in the after tur two 10-inch guns, the necessary changes in the plans for that have been made.

The Department contemplates mounting 8-inch guns of 40 cali length on Cruiser No. 12.

An appropriation having been made for fitting out the *Lancaster* as a gunnery ship, the Bureau has begun the manufacture of her new armament. Her main battery will consist of one 8-inch, two 6-inch, and two 4-inch B. L. R., and will soon be completed and installed.

The Department having decided to use the *Alarm* as a gunnery training-ship for apprentices, the Bureau has temporarily installed upon her a 6-inch B. L. R. and a secondary battery of two 3-pounders and one 37$^{\text{mm}}$ R. C.

The service trials of the dynamite guns of the *Vesuvius*, and the tactical tests with that vessel, have not yet taken place owing to failure of the company to fill an order for projectiles.

The increased rapidity of delivery of forgings from the Bethlehem Iron Company and Midvale Steel Company, and the development of the Washington Gun Factory, are such as to warrant the belief that batteries can hereafter be furnished ships as fast as they are completed.

It is gratifying, as each of the modern vessels is provided with her armament and makes her prescribed sea tests, that favorable reports of the performance of the ordnance material are received. The Bureau, however, proposes to make extensive experiments with the view of improving certain minor details.

THE BETHLEHEM CONTRACT.

The contract with the Bethlehem Iron Company for steel gun-forgings, dated May 1, 1887, provided for the material for the following guns:

6-inch	46
8-inch	4
10-inch	24
12-inch	2

Under the provisions of this contract the Department has changed the numbers of the different calibers as follows:

6-inch	41
8-inch	6
10-inch	22
12-inch	4

These changes were made in connection with further orders for sixteen sets of 6 inch forgings from the Midvale Company, for the purpose of keeping the gun factory supplied with forgings and of providing in time the main batteries of new vessels as finally fixed.

During the year further orders have been placed with the Bethlehem Iron Company for seven sets of 8-inch, three sets of 6-inch, two sets of 5-inch, and ten sets of 4-inch forgings.

The company has thus far delivered under the contract and the above orders seven sets of forgings for 8-inch guns, twenty-five for 6-inch guns, six for 4-inch guns, and three for 10-inch guns. These deliveries are in advance of the contract times.

Some of the forgings for 12-inch guns are in course of manufacture, and deliveries of these sets will soon commence.

In order to provide in time the material for the guns of the main batteries of all the ships now authorized, including the three battle-ships and cruiser of 7,500 tons, the Department has made an additional contract with the Bethlehem Iron Company for the following sets of forgings for guns of different calibers:

6-inch guns of increased length and power	3
8-inch	14
12-inch	4
13-inch	12

The delivery of the 12-inch and 13-inch forgings is to begin in teen months. It is expected that the large gun-lathes will be er in time for these forgings, and that these guns will be completed out delay.

The plant which is being installed by the Bethlehem Iron Com for the manufacture of armor under the contract with the Nav partment, dated June 1, 1887, has taken longer in its completion was contemplated. It is not yet completed, nor have any deliver armor under the contract been made.

The estimated dates of completion of the different parts of th plant of this company are as follows: 125-ton hammer, June 1, treatment plant for armor, January 1, 1891; treatment plant for forgings above 12-inch caliber, July 1, 1891; bending press for a July 1, 1891,; plate-mill, October 1, 1891.

I desire to mention specially the able and thorough work of I C. A. Stone in connection with the preparation of the specificatio the important contracts for forgings and armor which have been during the year by the Department.

ADDITIONAL ORDERS FOR ARMOR PLATES.

In order to prevent delay in the completion of the coast-defense v *Monterey*, for the want of portions of her armor, without which he could not be finished, an order was placed with the Bethlehem Company, of South Bethlehem, Pa., for the barbette armor of this v about 160 tons, to be delivered in six months.

The greater part of the protective decks of the *Maine* and *Texas*, v armor was included in the Bethlehem contract, having been othe supplied, the Department has obtained the consent of the Bethl Iron Company to substitute therefor an equal weight of nearly si armor for other vessels. The sponson armor for Cruisers Nos. 7, 10, and 11 will be thus supplied, leaving a balance of over 800 to their armor under that contract still available.

THE MIDVALE STEEL COMPANY.

The Midvale Steel Company, of Nicetown, Philadelphia, Pa., is engaged in the installation of a plant for the manufacture of for for guns of larger calibers than it has hitherto undertaken to fur

By the early part of next year it is thought that this compan be able to cast, forge, and machine 10-inch gun-work, and to cas forge to 13-inch gun-work.

There will thus be two firms in the United States ready to suppl gun forgings that are likely to be needed.

The delivery of the six sets of 6-inch forgings mentioned in th report having been completed, further orders for sixteen sets of 6 were placed with the Midvale Company, and of these ten sets have delivered.

Besides this, the forgings for five 6-pounder field-guns and twent 4-inch guns have been ordered from the Midvale Company, and a ing rapidly supplied.

This company has thus far furnished the Department with sev five sets of 6-inch and eight sets of 4-inch forgings.

THE NEW GUN FACTORY.

The buildings for the gun factory proper have been completed last report, all the machinery has been installed in the south gun- and is in full operation. The 110-ton overhead traveling cran been erected on its supports in the north gun-shop, tested and found to be satisfactory. A few changes in the hoisting-purchase are being made by the contractor, upon the completion of which the crane will be accepted. The large gun-lathes for this shop have been contracted for by the Department with Messrs. Wm. Sellers & Co., of Philadelphia, Pa., under date of July 10, 1890, after advertisement dated December 27, 1889, February 13 and March 7, 1890.

The Department's design and the Seller's design for these lathes will be found figured in the appendix.

This contract requires the completion and erection of two of the lathes by January 10, 1892, and all of the lathes within thirty-three months from the date of the contract, or by April 10, 1893, and the contract date for the delivery of the forgings for 12 and 13 inch guns is made to correspond with the deliveries of these large machine tools, that there may be no delay in the completion of the main batteries of the battle-ships.

The Bureau considers that the large gun-lathes of this contract will be superior in design, capacity, handiness, and accuracy of work and in finish to any similar machine tools now in use abroad, and the Department is to be congratulated upon this development in our resources. Tools of this class and size are at present only manufactured by two or three firms, and these in England and France.

The shrinkage-pit and gun-carriage shop have been completed since last report, and are in full operation; the office building also has been completed and is at present occupied.

The railway siding, which has been constructed from the Baltimore and Potomac Railroad into and around the navy-yard, has greatly facilitated the delivery of gun-forgings and the shipment of ordnance material.

The Bureau has acquired by purchase a shifting-engine.

The Bureau has acquired during the year several *special* machine tools, notably boring-mills and boring and turning lathes, of the firm of Bement, Miles & Co., of Philadelphia, Pa., and desires to mention specially their efficiency and the merits of the manufacture.

With the increase in the quality and the amount of the machinery at the naval gun factory and in the adoption of fixed and advantageous methods of shop administration and of settled principles, a large economy has resulted in the production of all material. This is especially apparent in the manufacture of tools, of projectiles, of guns and carriages.

The following tables illustrate the material advantages above referred to:

Guns.

Caliber	Average cost of manufacture.			Average time of manufacture in 10 hour days.	
	Washington Gun Factory.		By contract with private firms.	Washington Gun Factory.	
	1888.	1890.		1888.	1890.
6-inch	$2,649	$1,298	$3,400	115	60
8-inch	5,163	2,772	8,500	225	120
10 inch	6,334	3,500	....	240	164

6-inch carriages.

	Labor.	Material.	Total cos
Average of—			
First 10	$4,423.10	$2,133.21	[illegible]
Second 10	3,027.41	1,283.32	[illegible]
Third 10	2,250.74	1,191.35	[illegible]
Fourth 10	1,968.05	1,344.67	[illegible]
Fifth 10	1,708.00	1,116.00	[illegible]

The Bureau has secured the services of a capable chemist, and installed a laboratory complete in all respects for analytical work for experiments in explosives in connection with the new proving gro at Indian Head.

A marked advantage in the direction of economy has already resulted from this new department in the item of lubricating oils, shop now manufacturing its own oil.

The Bureau anticipates advantageous developments in various directions from this addition to the facilities of the gun factory.

The shops have been completely provided with an electric-lighting plant, and it is at present practicable to work at night in case s course should be demanded.

A contract has been made with the Morgan Engineering Company of Alliance, Ohio, for a 15-ton crane, which will be placed upon the tracks of the 40-ton crane now in use in the south gun-shop, the latter having been found insufficient to perform the work required of it.

The Bureau proposes to extend these tracks, which now reach but to the shrinking-pit, throughout the whole length of the north gun-shop, in order to avoid the disadvantage of shifting weights from one crane to another.

The gun factory is at present under the charge of Commander Charles O'Neil, to whom the Bureau is indebted for many valuable improvements and suggestions in the development of the machine plant and of the naval material.

NAVAL ORDNANCE PROVING GROUND.

This establishment has been since last report in the charge of Lieut. Commander J. H. Dayton, U. S. Navy.

Proof of guns and mounts, both for main and secondary batteries, the development and test of powders, ballistic tests of steel for ordnance purposes, the trial of projectiles of all kinds, the ranging of guns, and numerous other trials and tests have been made.

Besides these, the second test of the Thurlow cast-steel gun and the competitive armor trials have occurred at the proving ground.

To the successful conduct of this necessary work all the officers stationed at the proving ground have contributed by their zeal and attention.

NEW PROVING GROUND.

Under authority of the acts of March 3, 1887, and June 30, 1889, the Bureau purchased, in February, 1890, a tract of land 659 acres in extent in Charles County, Md., on the Potomac River and about 26 miles below Washington. At this spot a wharf has been built, magazine and instrument houses are being erected, butts put up, gun platforms for all calibers of guns constructed, and all preparations made for prosecuting the necessary work of proving and ranging guns and testing powder, carriages, projectiles, and other ordnance material. This important work has been in charge of Ensign R. B. Dashiell, and the Bureau begs to commend his zeal and ability in its prosecution. It is proposed to transfer to this point all the work thus far done at the Annapolis Proving Ground, and it is believed that the difficulties and risks which have attended such work at Annapolis will no longer exist. The greatest advantage to be realized by the transfer, however, will be the saving in time and cost of transportation from the gun factory to and from the proving ground.

It is anticipated that the advantages of the direct contact of the manufacturing establishment with the proof of the material will be at once apparent, and result in increased efficiency in all departments of the manufacture.

ARMOR TRIALS.

During the year reports were received from abroad of remarkable results obtained in private trials of a new material for armor, an alloy of steel with nickel. The Department, recognizing the importance of adopting while there was yet time the best possible armor for the Navy, thereupon resolved to hold a competitive trial of armor plates at the Naval Ordnance Proving Ground at Annapolis. Accordingly three plates, the first a compound plate made by Cammell & Co., the second a steel plate made by Schneider & Co., and the third a nickel-steel plate by the same firm, all 8 feet by 6 feet by 10½ inches, and backed by 38 inches of oak strongly braced, were submitted to a competitive test before a naval board, of which Rear-Admiral Kimberly was president.

Each of these plates was attacked with four 6-inch Holtzer shells of 100 pounds weight, and having a velocity of 2,075 foot-seconds, and one 8-inch Firminy shell of 210 pounds weight, and having a velocity of 1,850 foot-seconds, the points of impact being at the four corners for the 6-inch and at the center for the 8-inch shell.

The compound plate was perforated by all the shell and practically destroyed by the 6-inch alone.

The steel plate kept out all the shell, but was badly cracked by the 8-inch.

The nickel plate kept out all the shell and remained without cracks.

The results of this, the first public trial of nickel-steel armor, have shown the wisdom of the Department in adopting steel rather than compound armor, and have indicated the probable superiority of nickel steel over simple steel.

In order that the Department might be in a position to take immediate advantage of the results of these very important experiments, by substituting nickel-steel for simple steel armor on ships now building and authorized, Congress was at once requested to appropriate $1,000,000 for the purchase, at the discretion of the Department, of nickel ore.

This appropriation having been made, the Department stands ready to adopt nickel-steel armor should further trials conclusively prove its superiority.

It may be confidently anticipated that nickel-steel will enter into the composition of projectiles, both common and armor-piercing, of gun-barrels for small-arms and later in the material used in the construction of artillery of large calibers.

The report of the Armor Board will be found in the appendix.

MISCELLANEOUS ARMOR TESTS.

The Bureau has had under consideration, in an experimental way, for some months past the development of a process of superficial carbonization of low steel or iron, invented by Mr. H. A. Harvey, of Newark, N. J. A number of experimental plates and other articles have been treated by this process and a quantity of tool steel has been thoroughly tested by the Bureau with extremely interesting results.

One plate about 2½ feet square and 6 inches thick was carbonized in a gradually decreasing amount to a depth of 3 inches, and subjected to a comparative ballistic test by the attack of a 6-pounder Hotchkiss projectile, with a similar plate, untreated. The resulting penetration in the untreated plate was about 3 inches. In the carbonized plate it was nil, the projectile being completely shattered.

In view of these results, which were reproduced and corroborated by further experiments, the Bureau has ordered an untreated armor plate 8 feet by 6 feet by 10½ inches, and proposes to have erected at the Washington navy-yard the necessary plant for treatment by the Harvey process. It will then be subjected to a ballistic attack with the 6-inch gun, and a comparative study made with the effects upon the foreign plates recently tested at Annapolis.

The object of the experiments, as will be apparent, is the development of an armor plate which shall possess a superficial hardness and the toughness inherent in all steel, or one of its alloys.

REDEMANN-TILFORD PROCESS.

The Bureau has also experimented with the Redemann-Tilford process of treating steel, which, it is claimed, likewise adds carbon to low mild grades of metal. The results were, however, not definitely successful. The Department has accepted an offer of the owner of this process to present a larger plate for further ballistic test.

RANGE-FINDERS.

The Fiske range-finders installed on the Chicago and Baltimore have been but partially tested, and the Bureau has ordered an extended trial of their value to be made with the instruments on board these vessels.

The results of these trials will be awaited before further issue of this device to the service.

THE WORKING OF GUNS AND CARRIAGES BY PNEUMATIC PRESSURE.

The tests of the 8-inch gun-carriage submitted to the Department by the Pneumatic Gun-Carriage and Power Company having shown, in the opinion of the naval board having charge of the trial, that it was inferior to the 8-inch gun-carriage designed and manufactured by the Bureau, some alterations of a minor character have been made by the company, and a further trial will shortly take place at the Naval Ordnance Proving Ground at Annapolis.

The construction by the company above mentioned of the pneumatic machinery and apparatus for controlling the 10-inch guns of the *Terror* has continued at the South Boston Iron Works under the inspection of Capt. E. O. Matthews, U. S. Navy.

The Bureau does not consider that this system of the control of the recoil possesses any advantages over the hydraulic principle adopted with marked success.

NAVAL MAGAZINES.

The Department has been obliged to abandon the naval magazine at Ellis Island for purposes and uses of the Treasury Department in connection with the landing of immigrants.

The act of Congress approved April 11, 1890, appropriated $75,000 for the purpose of purchasing a new site and to erect the necessary buildings thereon. A desirable site has been selected at Dover, N. J., the same being a portion of the territory acquired by the Ordnance Department of the U. S. Army, and preliminaries to acquire the site in question have been instituted.

The position is well adapted for ordnance purposes, it being at a distance inland and thus sheltered from attack by a possible enemy on the water, and is in direct communication with the port of New York by rail.

The Bureau proposes to have a store vessel, to be anchored in the bay of New York, in a safe position, of sufficient capacity to contain the explosive supplies of a small number of vessels.

At present the Bureau has received courteous permission from the War Department to place its stores of explosives at Fort Wadsworth, New York Harbor. These magazines are, however, unsuitable for our purposes on account of dampness, and it is desired to have these stores removed elsewhere at as early a date as practicable.

The site of the magazine at Craney Island, near Norfolk, has become untenable through the advances of the sea and through the deterioration of the sea-walls. The approaches are also rapidly filling up, and it is but a question of a very short time before it will be impracticable to approach the wharf with vessels of any draught above 4 feet. Extensive repairs are also needed to the wharf.

Further, the site is greatly exposed to attack from an enemy on the water and the buildings with their contents could be destroyed without any difficulty whatever by the enemy's vessel which had passed the outer land defenses.

The Bureau, therefore, recommends that this site be abandoned and that a new magazine be built at a station which shall be selected near Norfolk, where the necessary conditions for defense and accessibility are more advantageous. The necessary estimates for this expense are submitted in the Annual Table of Estimates.

The Department having been informed by the Treasury Department that the present location of the powder magazine at Sitka, Alaska, is dangerously near the custom-house, and having been requested to remove the powder and ammunition therein stored to a safe distance, an estimate has been inserted for the amount necessary to construct a new magazine.

NAVAL TORPEDO STATION.

The Naval Torpedo Station is at present under the charge of Commander T. F. Jewell, U. S. Navy.

The Bureau proposes in the near future to carry on at this station a large amount of important work in the development of explosives and experimental torpedoes, of both American and foreign invention.

In preparation for this work and on account of pressure for time, owing to the chemical and physical investigation of a large number of inventions in the direction of high explosives, the usual class of officers has not been ordered for instruction to this station during the past year.

The status of the War College has also rendered this impracticable.

I suggest for your consideration the evident advantages of discontinuing this class at the Naval Torpedo Station.

It seems clear that it will be to the advantage of the Department that the Bureau possess a station which shall be devoted exclusively to experimental and manufacturing work, as it has not proven useful to carry on both an educational institution and a manufacturing establishment and such other work as above described at the same time in the same place.

It will be appreciated that the Department has in the near future an enormous amount of experimental research to look forward to, and this must be done somewhere. The Bureau proposes, therefore, to increase the manufacturing plant at the torpedo station, to augment the corps of assistants, and to endeavor to achieve results from domestic sources of a character commensurate with the importance and necessities of the new armament.

WAR COLLEGE.

The War College, at present in charge of the Bureau of Navigation, being in the immediate vicinity of the torpedo station, the plant, apparatus, and work done at the latter will be accessible to those under instruction at the War College, and every facility will be given to them in the prosecution of their studies.

A synopsis of the work of the torpedo station during the past year is appended.

INSTRUCTION OF ENLISTED MEN.

The instruction of enlisted men in ordnance work and practical electricity has continued at the Washington Gun Factory and at the Torpedo Station, Newport, R. I.

The average number under instruction during the year has been twenty-five at the gun factory and twenty-seven at the Torpedo Station.

It is considered that this course of instruction is of the greatest value to the naval service, and the Bureau hopes that the adoption of the valuable suggestions in regard to it contained in the reports of Commanders T. F. Jewell and Charles O'Neill, U. S. Navy, will still further systematize and improve it.

The following statements are appended, viz:

A.—Statement showing the amount appropriated under each specific head of appropriation for the service of the Bureau of Ordnance during the fiscal year ending June 30, 1890, expenditures during the same period, and balance remaining on hand June 30, 1890.

B.—Statement of the number of days' labor and cost thereof from July 1, 1889, to June 30, 1890, at the respective navy-yards and stations chargeable to the Bureau of Ordnance.

C.—Amounts expended during the fiscal year ending June 30, 1890, from the appropriations under the Bureau of Ordnance, for civilians employed on clerical duty or in any other capacity than as ordinary mechanics and workingmen.

I am, sir, your obedient servant,

W. M. FOLGER,
Chief of Bureau.

Hon. B. F. TRACY,
Secretary of the Navy.

A.—*Statement showing the amount appropriated under each specific head of appropriation for the service of the Bureau of Ordnance during the fiscal year ending June 30, 1890, expenditures during the same period, and balance remaining on hand June 30, 1890.*

Appropriation.	Appropriated.	Expended.	Balance June 30, 1890.
Ordnance	$141,000.00	$130,082.01	$10,917.99
Repairs	15,000.00	8,944.77	6,055.23
Civil Establishment	24,525.00	20,998.66	3,526.34
Contingent	8,000.00	5,807.73	2,102.27
Torpedo Corps	75,000.00	53,806.15	21,193.85
	263,525.00	219,639.32	43,885.68

The amounts expended were—

For labor	$139,936.93
For material, etc	79,702.39

The balances remaining are all needed to meet outstanding obligations, except the balance under "Civil Establishment."

The above statement does not embrace continuous appropriations for the new ships or for special objects.

B.—*Statement of the number of days' labor and cost thereof, from July 1, 1889, to June 30, 1890, at the respective yards and stations, chargeable to the Bureau of Ordnance.*

Navy-yard.	Number of days.	Cost.
Portsmouth	983	$2,403.22
Boston	1,063	2,470.91
New York	17,180	44,785.78
League Island	816	1,796.04
Washington	278,366	645,506.72
Norfolk	6,247	12,181.10
Pensacola	318	480.00
Mare Island	7,062	18,474.29
Key West, Florida	31	75.00
Naval Ordnance Proving Ground	16,181	19,253.07
Torpedo Station	13,077	33,251.77
	341,319	780,680.90

Includes labor on outfit for the new ships and under appropriations for special objects.

C.—*Amounts expended during the fiscal year ending June* 30, 1890, *from the appropriations under the Bureau of Ordnance, for civilians employed on clerical duty or in any other capacity than as ordinary mechanics and workingmen.*

Navy-yard.	Rating.	Amount paid.
Portsmouth	1 writer (6 months)	$500.00
Boston	1 writer (6 months)	500.00
New York	1 clerk	1,400.00
	1 writer, Bethlehem Iron Works (9 months)	840.00
Washington	1 clerk	1,600.00
	1 writer	1,017.25
	1 writer	1,017.25
	1 copyist	720.00
	1 copyist	720.00
	1 telegraph operator	900.00
	1 draughtsman	1,544.98
	1 draughtsman	1,081.00
	1 draughtsman	986.22
	1 draughtsman	1,051.38
	1 assistant draughtsman	638.76
	1 draughtsman (26 days)	117.00
	1 draughtsman	857.50
	1 draughtsman	1,186.75
	1 draughtsman	717.00
	1 draughtsman	931.50
	1 draughtsman	757.50
	1 draughtsman	461.00
	1 draughtsman (24 days)	72.00
	1 draughtsman	791.25
	1 draughtsman	784.50
	1 draughtsman	101.06
	1 writer	1,252.00
	1 writer	961.12
	1 writer	915.00
	1 writer	777.50
	1 writer	811.67
	1 copyist	614.00
	1 copyist (157 days)	511.62
	1 superintendent	749.06
	1 foreman	1,499.27
	1 foreman	1,499.27
Norfolk	1 clerk	1,200.00
Mare Island	1 writer	1,017.25
Naval Ordnance Proving Ground	1 writer	1,017.24
Torpedo Station	1 chemist	2,500.00
	1 clerk	1,200.00
	1 draughtsman	375.23
		38,194.33

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the Bureau of Ordnance, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
SALARIES.			
Chief clerk (increase of $200 submitted) (act July 11, 1890; R. S., p. 70, sec. 416)	$2,000.00		
Draughtsman (same acts)	1,800.00		
One assistant draughtsman (acts July 11, 1888, July 11, 1890; 26 Stats., 283, sec. 1)	1,400.00		
One clerk of class 3 (act July 11, 1890; R. S., p. 27, sec. 167)	1,600.00		
One clerk of class 2 (same acts)	1,400.00		
One clerk of class 2 (submitted)	1,400.00		
One clerk of class 1 (same acts)	1,200.00		
One clerk (same acts)	1,000.00		
One copyist	900.00		
One assistant messenger	720.00		
One laborer	660.00		
		$14,080.00	$12,480.00
NOTE.—To properly dispose of the increased volume of work passing through the bureau and keep accurate records such as the interests of the service demand, an increase of the clerical force is urgently needed, and one additional second-class clerk is asked for.			
ORDNANCE AND ORDNANCE STORES.			
For procuring, producing, preserving, and handling ordnance material; for the armament of ships; for fuel, tools, material, and labor to be used in the general work of the Ordnance Department; for furniture at magazines at the ordnance dock, New York, and at the naval ordnance proving ground (appropriated June 30, 1890)	$130,000.00		
For expenses of target practice (submitted)	30,000.00		
For proof of naval armament (appropriated June 30, 1890)	10,000.00		
For a new magazine for naval purposes at Sitka, or Juneau, Alaska (submitted)	20,000.00		
NOTE.—The present magazine, which is entirely unsuitable for the purpose, is very near the custom-house, in which the collector now resides, and renders that building dangerous.			
For removal of magazine at Craney Island to a more suitable and safe locality (submitted)	75,000.00		
		265,000.00	144,000.00
RESERVE SUPPLY OF PROJECTILES.			
For a reserve supply of common cast-iron projectiles for each vessel in commission (main battery) (submitted)		60,000.00	
NOTE.—The above estimate is intended to provide a supply of projectiles to meet a sudden emergency.			
REPAIRS, ORDNANCE.			
For necessary repairs to ordnance buildings, magazines, gun parks, boats, lighters, wharves, machinery, and other objects of the like character (appropriated June 30, 1890)		40,000.00	15,000.00
NOTE.—An increase of $25,000 over the usual estimate is asked for to provide for the repair and preservation of tools and machinery at the Washington navy-yard.			
CONTINGENT, ORDNANCE.			
For miscellaneous items viz: Freight to foreign and home stations, advertising, cartage, and express charges; repairs to fire engines, gas and water pipes; gas and water tax at magazines; toll, ferriage, foreign postage, and telegrams to and from the Bureau (appropriated June 30, 1890)		10,000.00	8,000.00
TORPEDO STATION.			
Labor, material, freight, and express charges; general care of and repairs to grounds, buildings, and wharves; boats; instruction, instruments, tools, furniture, experiments, and general torpedo outfits (appropriated June 30, 1890)		75,000.00	60,000.00

Estimates of appropriations required for the service of the fiscal year etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
CIVIL ESTABLISHMENT.			
Navy-yard, Portsmouth, N. H.:			
One writer (appropriated June 30, 1890)	$500.00		
Navy-yard, Boston, Mass.:			
One writer (appropriated June 30, 1890)	500.00		
Navy-yard, New York:			
One clerk (appropriated June 30, 1890)	1,400.00		
One writer (submitted)	1,017.25		
Navy-yard, Washington, D. C.:			
One clerk (appropriated June 30, 1890)	1,800.00		
One clerk (appropriated June 30, 1890)	1,200.00		
One clerk (submitted)	1,200.00		
Two writers, at $1,017.25 each (appropriated June 30, 1890)	2,034.50		
One draughtsman (appropriated June 30, 1890)	1,800.00		
Three draughtsmen, at $1,081 each (appropriated June 30, 1890)	3,243.00		
One assistant draughtsman (appropriated June 30, 1890).	772.00		
Two foremen; one at $1,500 and one at $2,000 (appropriated June 30, 1890)	3,500.00		
Two copyists, at $720 each (appropriated June 30, 1890).	1,440.00		
One telegraph operator and copyist (appropriated June 30, 1890)	900.00		
Navy-yard, Norfolk, Va.:			
One clerk (appropriated June 30, 1890)	1,200.00		
Navy-yard, Mare Island, Cal.:			
One writer (appropriated June 30, 1890)	1,017.25		
Naval ordnance proving ground:			
One writer (appropriated June 30, 1890)	1,017.25		
Torpedo station, Newport, R. I.:			
One chemist (appropriated June 30, 1890)	2,500.00		
One clerk (appropriated June 30, 1890)	1,500.00		
One draughtsman (appropriated June 30, 1890)	1,500.00		
NOTE.—The above estimate adds one clerk at $1,200 to the office force at the Washington navy-yard and increases the pay of the principal clerk and the principal draughtsman $200 each. These are very laborious and responsible positions and are filled by most efficient and excellent men who should have the rate of pay estimated for. An additional writer is also asked for at the New York navy-yard, and an increase of $300 in the pay of the clerk at the torpedo station. These increases are recommended by the stations named and are approved by the Bureau. An increase of $500 in the pay of one of the foremen at the Washington navy-yard is also asked for and recommended.		$30,041.25	$26,624.00
INCREASE OF THE NAVY.—ARMOR AND ARMAMENT.			
Towards the armament and armor of domestic manufacture for the vessels authorized by the act of August 3, 1886; of the vessels authorized by section 3 of the act approved March 3, 1887; of the vessels authorized by the act approved September 7, 1888; of the vessels authorized by the act approved March 2, 1889, and of those authorized by the act of June 30, 1890 (appropriated June 30, 1890)		$4,158,850.00	$2,500,000.00
NOTE.—The above estimate includes the material for and manufacture of twenty-five 5-inch guns and carriages for merchant vessels.			

Respectfully submitted.

W. M. FOLGER,
Chief of Bureau.

REPORT OF BOARD ON TRIAL TRIP OF THE CUSHING.

BRISTOL, R. I., *March* 31, 1890.

SIR: The board appointed by the Department to assemble at the works of the Herreshoff Manufacturing Company on the 10th instant, for the purpose of witnessing and reporting upon the trial of torpedo boat No. 1, the *Cushing*, in accordance with the precept appended, marked "A," has the honor to submit the following report:

The board assembled at the time and place prescribed and proceeded to consider the precept of the Department, and the contract and specifications for the boat. After deliberation, the following outline of a programme was adopted and submitted to the contractors in a letter by the senior member of the board, a copy of which is appended marked "B."

First. All movable articles not in the nature of permanent fittings shall be removed from the boat; she shall then be examined as to the construction of the hull, machinery and fittings.

Second. The boat shall then be weighted, as provided in the circular of the Navy Department, dated July 22, 1887, the weights to be distributed, as nearly as may be, in the positions which the articles they represent are to occupy. If opportunity offers, the boat will be listed for stability.

Third. The trial runs, as prescribed in the aforesaid circular, will then be made whenever the contractors shall see fit. On the completion of the speed trials the vessel will be maneuvered, both inside and outside the bay, if time permits.

Fourth. The vessel is then to be coaled to the full capacity of the bunkers, and otherwise weighted sufficiently to simulate the conditions specified in the ninth article of the contract, when a trial run at sea shall be made to determine whether she shall be able to carry the weights aforesaid safely and properly at sea.

The contractors having no objection to any part of the programme, it was proceeded with.

The boat having been cleared of all movable articles, she was inspected by the board, the engineer and constructor members of the board making a minute and careful examination of the hull and machinery. Their reports to the board are appended marked "C" and "D."

The following variations in the hull, machinery, and fittings from the specifications were found, viz:

(Page 2 of specifications.) *Deck and coal-bunker fronts.*—The deck plating is riveted as directed. Butts of coal-bunker plates are strapped and stagger riveted; seams lapped and single riveted.

This departure is in accordance with modern European practice. The double riveting was not called for by the circular of July 22, 1887, although the specifications mention it. The single riveting allows a reduction of width of butt strips and laps of plates with a corresponding reduction of weight.

(Pages 2 and 3) *Compartments.*—Bulkheads on frames Nos. 28 and 67 are not pierced with openings for ventilation, as with the new type of boiler it is not possible to run pipes from these openings to smoke-stack casing as originally intended.

The shape of new boiler, and length of firemen's tools required to work it, render it impossible to place light air tight partition as directed.

Bulkheads on frames Nos. 41 and 54 have no passage door and only one spy-hole each, the space on these bulkheads being occupied by blowers and engines, donkey-pumps, and distiller engine.

These changes from the specifications were considered as authorized by the Department's letter of July 3, 1889, which authorized change in boiler.

(Page 3.) *Entrances, hatchways, etc.*—The two hatchways intended to give admission to space behind the boilers are omitted as not practicable with new type of boilers.

(Page 3.) *Lighting.*—There are seven windows in forward conning tower and four in after tower, making a total of eleven, instead of ten as required.

The additional lights in the forward conning tower have been put in to give a better view to the steersman. One light in the after conning tower has been omitted, as the position of the after smoke-stack rendered it of no value, and it would have been an additional weight.

(Page 3.) *Ventilators.*—Ventilation by means of the outer jackets or smoke-stacks has not been used on account of the greater height of new type of boilers.

The authorized substitution of new type of boilers does not allow of the closed boiler space and system of ventilation originally contemplated. The height of the boilers makes it impossible to utilize the space between the outer and inner jackets of smoke-stacks without making the connections above the deck. The ventilation through the conning towers and small deck ventilators is thought to be sufficient.

(Page 3.) *Pumping engines.*—Air-pump engines specified as compound, changed to simple on account of being able to control them better by a governor.

Circulating pump and blower engines specified as compound, changed to simple cylinders on account of taking up less room and weighing less.

Both these changes approved by Department's letter of June 28, 1889.

(Page 3.) *Donkey-pumps.*—There being two bilge suctions for each donkey-pump, one to bilge of fire-room, in which it is placed, the other to bilge of engine-room. These pumps are not connected to the main drain-pipe, and any accident to that pipe would not interfere with their working.

The separation of the pumping appliances into three distinct systems, in which the workings of each should be entirely independent, was thought of such importance as to warrant the change.

(Page 4.) *Boilers.*—Boilers specified as "Herreshoff's Improved" square type. Changed to Thornycroft type on account of being able to stand forced draught better. Approved by Department July 3, 1889.

(Page 4.) *Safety valves.*—There are two automatic valves delivering into the atmosphere, and two hand valves conveniently located near steam-gauges, one for each boiler, delivering into the condenser.

(Page 5.) *Ejectors.*—The following list gives the number of ejectors in each compartment, together with the actual measured capacity of each:

	Tons.
Compartment No. 2, one of 25 tons, or a total of	25
Compartment No. 3, two of 25 tons each, or a total	50
Compartment No. 4, one of 25 tons, or a total of	25
Compartment No. 5, two of 25 tons each, or a total of	50
Compartment No. 6, two of 25 tons each, or a total of	50
Compartment No. 7, two of 25 tons each, or a total of	50
Compartment No. 8, two of 25 tons each, or a total of	50
Compartment No. 9, one of 25 tons, or a total of	25
Compartment No. 10, one of 25 tons, or a total of	25
Ejectors, total capacity	350
Measured capacity of centrifugal pump	450
Estimated capacity of donkey-pumps	40
Total discharge per hour	840

The ejectors each have a non-return valve at their discharge, so that if a boat heels heavily no water can enter by them.

NOTE.—It is to be noticed that by the pumping arrangements as actually fitted, there are three distinct systems, entirely independent of each other, viz, the ejectors, bilge suction-pipe or main drain, and donkey-pumps.

The maximum amount of water that can be removed from any one compartment is shown in the following table:

Number of compartment.	Ejectors.	Main drain.	Donkeys.	Total.
	Tons.	*Tons.*	*Tons.*	*Tons.*
2	25			25
3	50			50
4	25	450		475
5	50	450	40	540
6	50	450	80	580
7	50	450	40	540
8	50	450		500
9	25			25
10	25			25

By putting in an additional number of injectors over that contemplated, the larger compartments contain two, one on either side of the boat, so that in case of excessive heating or listing of the boat one of them should always be accessible.

(Page 5.) *Propellers.*—Propeller wheels specified as made of forged steel or aluminum bronze. Changed to manganese bronze because contractors were unable to have them forged in steel, and it was found that aluminum bronze gave rougher castings. Approved by Department July 31, 1889.

(Page 5.) *Machinists' room.*—There are four berths fitted instead of three, as called for by specifications.

The space was available, and it was thought desirable to put in the berth.

(Page 6.) *Torpedo room.*—A wash-bowl for crew is fitted in compartment No. 4, that called for by specifications.

(Page 6.) *Cooking arrangements.*—A dresser, sink, and lockers, and pump for fresh-water tanks, are fitted near gallery, that are not called for by specifications.

(Page 6.) *Davits.*—The davits for hoisting in torpedoes is supplied, and two steps fitted for it. A separate anchor davit is also supplied, and two steps fitted for it.

(Page 6.) *Anchors, cables, etc.* Two steel-wire cables of 60 fathoms each are supplied in place of one chain cable.

This change was made because the two wire cables of equal strength to chain are much lighter, take up less room, and are better adapted for use with the steam hoisting reel and capstan.

(Page 6.) *Gratings.*—Light oak gratings are fitted instead of pine. Oak was considered stronger and more durable.

The movable fittings of the boat were then weighed and replaced on board, water and coal were supplied, and weights were added up to a total weight of 17 tons, as required by the circular before referred to. The trial run for speed were attempted on the 12th instant, but owing to the foaming of the boilers, fully described in the report of Passed Assistant Engineer Potts, of the Board, the speed trials were abandoned. Maneuvering trials were made, however, the results of which are appended, marked "E." During these trials the boat was twice backed for a distance of about 1½ knots at a speed (estimated by bearings) of about 13 knots per hour. While backing she was perfectly controlled by the helm, although quite a fresh breeze was blowing.

On the 14th instant a speed trial was undertaken a second time, but before it had well begun the revolution counter of the starboard engine broke down, and the trial was necessarily abandoned. On that day the contractors informed the Board that, on account of the illness and absence of several of the crew, they desired the trials suspended until the 19th instant, so that they might train other men for the work. As the Board considered the request of the contractors entirely reasonable, the delay was assented to. During the interval the contractors placed the vessel in dock and cleaned her bottom. The majority of the Board availed themselves of the opportunity to examine the outside of the vessel, her propellers, etc., and to make measurements of the latter. She was again ready for trial on the 20th, but unfavorable weather prevented the speed trials until the 24th instant. It is pertinent to remark that at no time during the interval from the 14th to the 24th instant was the weather such as to permit the trials to be made, even had there been no other cause for delay.

On the 24th instant the boat was weighted as prescribed by the circular heretofore mentioned, as follows:

Weights on board for speed trial March 24, 1890.

	Tons.	Pounds.
CREW AND OUTFIT.		
Crew (twenty-four persons)	1	1,720
Two anchors	......	372
Two wire cables	......	360
One manilla cable	......	219
Boat and outfit	......	260
Life-preservers (18 jackets, 2 cork rings)	......	157
Drinking water	......	500
Electric revolution counters and appliances	......	169
Total	2	1,517
COAL AND WATER FOR BOILERS.		
Coal in bunkers	9	....
Water in tank for boilers	1	....
	10	....
WEIGHTS TO REPLACE TORPEDO APPLIANCES.		
Two tubes and 2 torpedoes in compartment No. 2, under whale-back	1	883
Air reservoirs in compartment No. 2, on floor	......	215
Two spare torpedoes in compartment No. 3, under floor	......	932
Two air-compressors in compartment No. 4, on floor	......	503
Two torpedoes and guns on deck between funnels	1	453
Total	3	746
WEIGHTS TO REPLACE GUNS AND AMMUNITION.		
Guns on deck between forward conning tower and funnel	......	1,100
Ammunition in compartment No. 3, in magazine on floor	......	1,120
Total	......	2,220

Recapitulation of weights.

	Tons.	Pounds.
Crew, boat, anchor gear, and miscellaneous articles	2	1,517
Coal and water for boilers	10	....
Weights to replace torpedo appliances	3	746
Weights to replace guns and ammunition	....	2,220
	17	8

The distribution of the added weights is shown in the blue print appended, marked G.

Thus loaded the speed trials were proceeded with. The wind was light (force 2) from WNW. and the sea smooth. For the measured mile runs the revolutions of the engines, and the time between the ranges were simultaneously recorded by electric chronographs. The number of revolutions of the engines during the three hours' trial were obtained by mechanical counters, two of which were attached to each engine. The highest number of revolutions recorded from these counters was taken as the number of revolutions made by the engines during the three hours' trials. Owing to the exhaustion of the fresh-water supply for the boilers and the lateness of the hour the three final runs on the measured mile were not had until the following morning, when the conditions of wind, weather, and tide were almost identical with those at the completion of the three hours' trial of the previous day. In the interval 4,025 pounds of coal and 1,120 pounds of water were put on board the boat and 2,000 pounds of ashes were removed, so that the displacement of the boat was increased by 3,145 pounds, which was to the disadvantage of the boat. The average speed during the three hours' trial, calculated as directed in the circular of the Department, was 22.52 knots per hour. A record of the speed trials is appended, marked F.

Throughout the three hours' run the engines worked smoothly, and there was no difficulty whatever in maintaining the required boiler pressure of 245 pounds, the safety-valves, which were set at 250 pounds, opening frequently. The vertical vibration of the boat was extremely small, the transversal vibration was moderate, and naturally most noticeable at the extremities. The performance of the boat was most satisfactory.

On the completion of the measured mile runs on the 25th instant the torpedo-boat at her light displacement was taken outside the bay, and a run around Block Island was made at a speed of about 16 knots. The wind was southeast, force 5, with a moderate short sea. During this run the boat was tried with the sea abeam and on either quarter, and was turned in both directions with about 30° helm. Under all circumstances the boat behaved well; there was but a slight vibration of the hull, the heeling due to turning was small, the rolling moderate and easy. With the sea abeam the period of one complete oscillation was 3.2 seconds.

In order to observe the behavior of the boat at her deepest displacement she was loaded with the following weights, in addition to the crew of twenty persons and outfit as furnished by contractors, viz:

Weights carried on loaded trial, March 27, 1890, in addition to crew of twenty persons and outfit as furnished by contractor.

	Tons.	Pounds.
Weights to represent torpedo gear and appliances	3	1,196
Weights to represent revolving cannon and ammunition	....	2,220
Coal in bunkers	33	....
Fresh water for boilers in tank in compartment No. 5	1	....
Fresh water for crew in tank in compartment No. 4	....	1,760
Oil, waste, and engineers' stores	....	200
Bedding for officers and men*	....	300
Clothing for four officers, at 50 pounds each*	....	200
Clothing for sixteen men, at 25 pounds each*	....	4 0
Provisions for twenty men for twelve days, with cooking utensils, table-ware, etc*	....	1,000
Additional oil, waste, and engineers' stores*	....	400
General stores, tools, paint, ropes, etc	....	500
Total	39	1,456

*These articles not being on board, and no other weights available, were represented by 2,800 lbs. of extra coal, placed in equal parts on the floor plates of the two fire rooms. The distribution of weights is shown in the appended blue-print "G."

The maximum of fuel endurance was assumed to be twelve days, and the allowance of stores and provisions was estimated for that time. The capacity of the coal bunkers is, however, greater than the 33 tons that was put into them. It is estimated that the bunkers will hold 38 to 40 tons of anthracite coal.

With these additional weights on board the draught of the boat was increased to 10 inches forward and 5 inches aft from the draught when light. The boat was taken outside of Point Judith. The wind was WNW., force 6, a long swell from southeast, with a moderate cross sea. When steaming head to sea considerable spray but no solid water came on board. The pitching was very slight, the rolling moderate and easy. The vessel was stopped with the sea abeam; in this condition the maximum roll did not exceed 20°, the period of one complete oscillation being 3.7 seconds. Complete turns were made with the starboard and port helm at angles of 10°, 30°, and 50°. The heel due to turning was slight. The boat was buoyant and took no water on board. While the sea was not as heavy as might have been desired, it was sufficiently so to determine the entire sea-worthiness of the boat.

The Board having completed its examination and trials of the boat, considered, paragraph by paragraph, the precept of the Hon. Secretary of the Navy, and presents its conclusions, as follows:

It is the opinion of the Board that the vessel is sufficiently strong to carry safely the personnel, armament, boilers, appurtanances, machinery and fittings mentioned in the specifications, together with such torpedoes, and their appendages, coal stores, and equipments of all necessary kinds as would constitute a liberal allowance for use during the longest period of "fuel endurance" that can be obtained by expending, at the most economical speed, the maximum weight of coal mentioned in said specifications; and that, when the vessel is loaded with all fittings, equipments, and stores above enumerated, or when she has on board a less amount of coal or other consumable stores than those aforesaid, she is able to carry the same properly, and safely at sea.

That the hull and fittings, and the machinery including the engines, boilers, and appurtenances of the vessel, are strong and well built, and in conformity with the contract and specifications except in the cases heretofore noted in this report. The most important of these changes have been duly authorized by the Department. Where they have not been specifically authorized, they are in the line of improvements.

The vessel is in all respects complete and ready for delivery, in accordance with the requirements of the contract, with the single exception of the distilling apparatus for supplying fresh water for drinking and cooking purposes, which is inefficient, on account of foaming and carrying over salt water. The contractors are to remedy this defect and the necessary changes in the distiller are in progress.

The Board is of the opinion that the minor changes recommended by the engineer member of the Board, except that regarding the strainers of the sea suction, would be improvements, but does not regard them as called for by the contract and specifications. The Board is not prepared to approve the recommendation that the strainers of the sea suction should point forward. The reason for the suggested change is that at a high speed the pumps will not take the water through the suctions as they now are, but in view of the fact that these pumps will probably not be in use at extremely high speeds, since in order to maintain the high speed fresh water must be used in the boilers, and that the strainers would project from the outer skin of the vessel, and thus, to some extent, detract from the speed, it is questionable whether the proposed change would be an improvement.

In conclusion, the Board desires to express its opinion that notwithstanding the fact that this boat is the first of its class built in this country, it compares favorably with the best results obtained abroad after years of experience in similar work; that the speed is satisfactory, and is not obtained by sacrificing either strength or durability; and finally that that the excellent construction of the hull and machinery, its admirable maneuvering qualities, its stability and sea-worthiness, make the *Cushing* a most creditable addition to the Navy.

Very respectfully,

THEO. F. JEWELL,
Commander U. S. Navy, and Senior Member of Board.
J. S. NEWELL,
Commander, U. S. Navy.
T. C. MCLEAN,
Lieutenant, U. S. Navy.
STACY POTTS,
Passed Assistant Engineer, U. S. Navy.
J. J. WOODWARD,
Assistant Naval Constructor, U. S. Navy.
Members.

HON. B. F. TRACY,
Secretary of the Navy.

REPORT OF BOARD ON PATRICK TORPEDOES.

College Point, N. Y., *September* 11, 1890.

Sir: The Board appointed by the Department's order of November 14, 1889, for the purpose of conducting the tests and trials of the Patrick torpedoes has the honor to submit the following report:

The Board assembled from time to time at College Point, and conducted the trials in accordance with the instructions of the Department. A copy of the minutes of the proceedings of the Board, together with a copy of the Department's instructions, and of the letter of the Department specifying the conditions to be fulfilled by the torpedoes are appended to this report.

But one torpedo was submitted for trial by the Board. The conclusions of the Board, following the order of the numbered paragraphs of the contract or order for the torpedoes, are as follows:

(1) The capacity of the explosive chamber is sufficient for the proper storage of more than 400 pounds of dynamite.

The explosive chamber constitutes the forward section of the torpedo. It can be entirely and safely removed for storage in a magazine.

(2) The axis of the torpedo, and consequently the center of the explosive charge, is 3½ feet below the surface of the water when the torpedo is at rest or moving at moderate speed. At high speeds, with the rudder amidships, the forward end of the torpedo lifts slightly. When the rudder is put either way, the lifting of the bow of the torpedo increases, and apparently, at times, amounts to as much as 1 foot.

(3) On August 19, in smooth water, the torpedo ran a reasonably straight course of 5,330 feet at a mean speed, correcting for currents, of 20.5 knots per hour. The mean speed for the first 2,646 feet was 22.52 knots per hour, and for the remaining 2,684 feet it was 18.83 knots per hour.

(4) On the speed trial the steering of the torpedo was perfectly under the control of the operator. After the run, the torpedo was stopped, started, and steered until the acid was exhausted. On the subsequent maneuvering trial, the torpedo was put through the various evolutions of starting, stopping, steering to starboard and port, and operated entirely to the satisfaction of the Board, until the gas was nearly exhausted, when the pressure became so much reduced that it was insufficient to work the stop-valve. In the opinion of the Board this did not occur until the torpedo had run an estimated distance of 2 miles.

The firing device is apparently safe and its efficiency on contact normal to the plans of the object and also at an angle of 30 degrees therewith was satisfactorily exhibited.

The torpedo is supplied with vanes carrying flags by which the course of the torpedo can be observed by day, and on which lights can be placed for night observation.

(5) The shell of the torpedo and the float are of copper. The mechanism and other parts are of materials best suited to their several purposes, and are of ample strength. The workmanship is of the best character.

(6) On the day of the trial a fresh northeast wind was blowing, and while there was considerable sea in the sound and the adjacent waters, the bay was comparatively smooth. But from our experience with the torpedo we see no reason why it should not perform equally well in such a moderate sea as a torpedo intended for harbor defense could reasonably be expected to encounter. In view of the time already consumed in the effort to demonstrate this feature, and of the uncertainty of more favorable conditions existing in the near future, the Board deemed it inadvisable to delay its report, leaving it to the Department to determine whether any further trial shall be necessary.

Very respectfully,

Theo. F. Jewell,
Commander U S. Navy, Senior member.
G. A. Converse,
Commander U. S. Navy.
J. S. Newell,
Commander U. S. Navy.

The Secretary of the Navy.

NAVAL TORPEDO STATION AND WAR COLLEGE.

NEWPORT, R. I., *October* 1, 1890.

SIR: I have the honor to submit the following report of the operations of this station during the past year:

The officers attached to the station are: Lieut. Commander H. W. Lyon, Lieut. Commander W. I. Moore, Lieut. T. C. McLean, Lieut. M. E. Hall (special duty), Prof. C. E. Munroe, chemist, Surgeon P. Fitzsimmons, Past Assistant Paymaster T. J. Cowie, general storekeeper.

Lieut. J. V. B. Bleecker and Acting Boatswain Hugh Sweeny have been under instruction a portion of the year.

Lieut. G. F. W. Holman was detached from the station April 18, Ensign H. M. Dombaugh June 2, and Surgeon J. C. Wise September 20. The loss of Lieutenant Holman's services was much regetted. He is a most capable, well informed, and energetic officer. Ensign Dombaugh has also performed his duties acceptably. To Dr. Wise's professional ability and careful oversight the station is largely indebted for its general good sanitary condition.

The general distribution of the duties of the station is as follows:

Lieut. Commander Lyon has general charge of the buildings and grounds, boats, boat-houses, wharves, and ways; the supervision of enlisted men, including the instruction and discipline of seamen under instruction; and instruction in diving.

Lieut. Commander Moore has charge of the machine and blacksmith shops, the gun-cotton factory and fuse-room; the preparation of outfits, and the instruction in fuse making.

Lieut. McLean has charge of the electrical laboratory and dynamo-room, all electrical plant and apparatus; of experimental electrical work and the instruction in electricity.

Lieutenant Marshall is in charge of the general torpedo work, the inspection of outfits, and of the magazines and manufactured explosives, and the instruction in torpedo work, countermining, etc.

Professor Munroe has charge of the chemical laboratory, the manufacture of fulminate and the charging of detonators, and the testing of manufactured gun-cotton.

In addition to the above specified duties all officers take part in the experimental work of the station. A large proportion of the experiments with explosives have been made by Professor Munroe. Lieutenant-Commander Moore has carried on an investigation on the detonation of gun-cotton by ignition, and Lieutenant Marshall has conducted the experiments with the detonating fuse, as well as certain experiments with emmensite.

Owing to the numerous and diverse demands upon the station, and the small number of officers employed, the work has been unremitting and laborious, but all the officers have performed their duties with great energy and have responded cheerfully to the calls made upon them.

BUILDINGS AND PLANT.

Much work has been done on the buildings during the past year. The torpedo boat house has been completed and a marine railway built, so that the station is now prepared to take out a first-class torpedo-boat. As at present arranged the boats are hauled out by a capstan, but it is hoped that hereafter a steam windlass may be fitted which will facilitate the handling of large boats. The boat-house, having three bays, will supply a place for the storage of the *Stiletto*, and the steam launches during the winter.

Storehouse No. 2 has been raised and a very respectable storage cellar built under it. The south end of this building has been arranged as an emergency hospital ward with three beds where cases of serious accident not admitting of transport, can be cared for. The north end of the building has been fitted up as temporary quarters for the seamen under instruction during the absence of the *Triana*.

A new shed for the carbonic acid generator and condensing pump has been built. This became necessary as this costly and important apparatus was much exposed to the weather in the old shed. The apparatus has been overhauled and put in thorough order, and is now in condition to be used for condensing carbonic acid or for compressing air for automobile torpedoes.

The building hitherto used as a paint-shop and tool-room has been fitted up as a laboratory for steel analysis and spectroscope room. This work has been done heretofore in the chemical laboratory, where work with explosives was carried on at the same time, an arrangement which was altogether unsuitable.

The officers' quarters have received the necessary current repair and have been repainted.

The machine-shop will require repairs to the floor before a great while, otherwise the building is in good condition.

The gun-cotton factory is in running order, but requires constant repair both to the building and the machinery on account of the rust and decay arising from the constant generation of acid fumes. The earthen-ware reservoirs have been a long time in use and are unreliable. It is the purpose to dispense with them altogether and to build a hoist from the acid cellar to the dipping-room, so that the acid may be placed in the original package, in position for distribution to the dipping-troughs. This device will do away with the system of pipes now in use, which requires renewal at frequent intervals.

A band-saw for shaping gun-cotton blocks as required and a rubber grinding machine have been added to the plant of the gun-cotton factory. The necessity for the former became apparent when it was required some months ago to fit charges of gun-cotton for the projectiles of the pneumatic guns of the *Vesuvius*. The latter is for use in the experimental manufacture of smokeless gun-cotton powder.

The main shop engine and pumps are in good condition. The boilers have given considerable trouble and have been subject to frequent repairs. This was due in a large measure to the fact that the feed water used in the boilers contained more or less oil. As a measure of economy a condenser had been fitted by which the exhaust steam from the engines was condensed and returned to the boilers. The water so obtained was produced at a small cost, but the rapid deterioration of the boilers very much more than offset the saving, and the use of the condenser has been discontinued.

The machine tools, with some exceptions, are in fair condition, but most of them are of antiquated patterns, unfit for rapid and accurate work. A number of additions to the plant of the machine-shop will have to be made before the shop can respond promptly and efficiently to the demands that may be made upon it.

The sea-wall at the south end of the island has been rebuilt and is now in good condition.

TRIANA AND BOATS.

The *Triana* was sent to New York for repairs early in the year, and has not yet been returned to the station. It is to be hoped that she will be completed in a short time. The services of a tug are indispensable in experimental torpedo work, besides which the *Triana* afforded accommodations for the men under instruction, which are superior to any that can be furnished elsewhere at the station.

The hull and engines of the *Stiletto* are in excellent condition. The boiler will have to be replaced by a new one. The present boiler is more than five years old, which is a long life for a boiler of this type, which has been frequently used with forced draught. I shall shortly submit to the Bureau the drawings and specifications of a water-tube boiler designed for this boat. It is similar in character to the Thorneycroft torpedo-boat boiler, but has the advantage of a smaller cost of construction and greater accessibility of parts.

A launching-tube for the Howell Automobile torpedo has been fitted to the *Stiletto* by the Hotchkiss Ordnance Company, and, with the Bureau's consent, the boat has been used in the preliminary experiments with the torpedo.

The steam-launches have received extensive repairs, and they are now in good condition, with the exception of an old launch, which has been in use many years as a torpedo and freight boat, and which should be replaced by a new and substantially built boat.

OUTFITS, ETC.

The supply of torpedo outfits for boats has been maintained at the required number by renewals whenever it was reduced by shipments. Outfits and parts of outfits have been sent to the Naval Academy, and to the *Baltimore*, *Philadelphia*, *Newark*, *Concord*, *Bennington*, *Pensacola*, *Enterprise*, *Essex*, and *Vermont*.

About five hundred electric vent-sealing primers have been made for the Naval ordnance proving-ground and for the cruisers.

Igniters and detonators have been made as required for the service. A supply of detonators has also been furnished the artillery school at Fortress Monroe.

No changes have been made in the outfit during the year. A new, more convenient, and more compact form of steam-drier for gun-cotton is, however, under construction.

A new edition of the Torpedo Instructions has been printed and its publication is delayed only until the plates, which are being printed, are received.

TORPEDOES.

The defense mine has made some progress during the past year, but it is not yet in a condition to be recommended for adoption. The unwieldy character of the instrument, as it existed a year ago, rendered it entirely unsuitable as a part of the equipment of vessel of war, and efforts have been directed toward simplifying it and rendering it less cumbersome. The arrangement for mooring automatically at a pre-arranged depth has been improved and may now be said to be entirely satisfactory. The apparatus for raising the mine can, however, be much simplified.

Two devices for accomplishing this, one the invention of Lieutenant McLean, the other of Lieutenant Marshall, are being experimented with. Both of them promise well, and while neither of them apparently leaves anything to be desired in the way of safety in handling, both reduce the amount of material, in weight as well as in bulk, forming the appendages of the mine. Experience will decide which of these devices will prove the most suitable. Lieutenant McLean's scheme includes the adaptation of the mine to use as an electro-contact controlled torpedo. As there seems to be a prospect that we shall be in possession of an automobile torpedo in the near future, he proposes that the explosive chamber of the torpedo shall form the magazine of the mine, thus saving stowage room. He also suggests a form of mine case, which, while perfectly adapted to the requirements of the mine, can be manufactured at much less cost than the present case, and, what is perhaps more important, can be manufactured at the station, since it requires no tools of a special nature. The station will thus be independent of private establishments, the importance of which will be realized when it is considered that mine cases ordered early in the year from a private firm, the only one having the plant necessary to do the work, have been received only during the last month.

Experiments have been carried on by the Hotchkiss Ordnance Company with the Howell automobile torpedo. The officers of the station have rendered such assistance in these experiments as was desired by the agent of the company.

The design for the arrangement of the explosive charge, the primer and the detonator, and the details of the disposition of the parts particularly pertaining to them in the head of the Howell torpedo, were, by the direction of the Bureau, made at the station.

Lieut. M. E. Hall is engaged in making working drawings for his automobile torpedo and will be prepared to submit them to the Bureau in a short time.

CHEMICAL LABORATORY.

The work in the chemical laboratory has been partly analytical and partly devoted to experiments with explosive substances.

Some fifty analyses have been made of specimens of steel for use in the manufacture of ordnance and armor, the reports of which have been rendered from time to time. The lack of modern laboratory facilities have made the process employed quite tedious, though the results obtained have left little to be desired in the way of accuracy. It has been necessary heretofore to conduct these analyses in the same laboratory in which the work with explosives is carried on, an arrangement obviously objectionable. As elsewhere stated in this report, a separate building has been fitted up as a laboratory for steel analysis. The station being already connected with the Newport water system, water has been laid on both laboratories and vacuum pumps set up. It is intended that the apparatus for steel analysis shall be kept always set up and ready for immediate use, and greater speed in the work will be the result.

A considerable number of experiments have been made for the purpose of developing a light-ball for naval use. The original proposition was to use calcium phosphide for the purpose, and experiments were made on a rather large scale, but while they proved that this substance was readily inflamed and burned in contact with water, the intrinsic luminosity of the flame was found to be so feeble as to render the substance worthless for this purpose.

That this was not a defect in the quality of the material used was shown by comparative experiments made between the American article and that used by a foreign government, the American article being decidedly the better. The phosphide having proved unsuited, experiments have been made with a number of compositions which have given excellent results as illuminating agents, but which are not yet wholly under control.

The disastrous explosions which have occurred with the modern prismatic powders—such, for instance, as that on board the *Admiral Duperré*—have led to an examination to determine if possible the nature of the change which these powders may undergo under service conditions of transportation and storage. As changes which appear very slight when confined to a single grain may become very serious when such large masses as are used in a single charge of a modern high-powered gun are involved, the laboratory examination is a nice one, and will require considerable time for its completion. Very decided progress has been made, however, and the results already obtained encourage the belief that some certain information regarding these changes will be gained.

Until quite recently the chemist has had no assistance in the laboratory other than that of an unskilled laborer, and it was impossible that he could keep up the current work of the station and at the same time pursue the researches absolutely necessary at an establishment of this kind. Within a few months two skilled employés have been added to his force and the beneficial effect is already apparent. Additions are being made to the chemical apparatus from time to time as circumstances permit, and it is intended that the laboratory shall eventually be equipped with the necessary apparatus for all kinds of explosive work.

EXPLOSIVES.

A large number of reports have been made to the Bureau during the past year, comprising the results of several hundred experiments with different explosives. These reports have treated of gun-cotton, bellite, emmensite, etc., of several varieties of smokeless powders, of the firing points of explosives, of the methods of testing their relative efficiencies, etc.

As the result of experiment, bellite is found to be very stable, insensitive to heat and to friction, to be exploded only by detonation. It possesses a rupturing force much superior to that of gun-powder and a projectile force about equal to that of gun-cotton. Repeated experiments have been made in firing shells charged with as much as 2 pounds of this explosive against iron plates with service charges of powder. No premature explosions have occurred, and several successful explosions after partial penetration have been obtained.

The most extensive series of experiments with any one explosive other than gun-cotton have been those made with emmensite. This material is insensitive to friction and impact of projectiles. It is ignited by flame, but only locally, and the combustion ceases as soon as the flame is removed. It is practically unaffected by changes of temperature between 60° and 120° Fah., although exposed to such severe changes for a long period, and is not injured by freezing and thawing. It is hygroscopic, absorbing water readily from the atmosphere, though it loses but little strength even after repeated saturation with water and drying. Its relative force compared with gun-cotton, by the lead-disk method, is as 26.6 to 33.5. It is capable of explosion by gun-powder fuze when strongly confined, giving an explosion which approaches detonation, if it is not really detonated.

Experiments have been made with a delayed action detonating fuse, constructed on lines suggested by the Bureau. The results of twenty-five fires from a 20-pounder bronze rifle, using a charge of 2 pounds of powder, were extremely satisfactory, but on the twenty-sixth fire the shell exploded in the gun. Previous experience had shown imperfections in the shells used, and to this cause may probably be attributed the premature explosion. These experiments are being continued.

The uniform character of the fulminate of mercury produced here leaves little to be desired in this substance. The making of the fulminate and the charging of detonators has become routine work in the chemical laboratory.

The Americanite, which has been stored in the magazines since the experiments were made with it in 1887, has been tested by firing trials again, and after two years' storeage, is found to be in practically the same condition as when placed in the magazine.

The investigation of methods of determining the relative efficiencies of explosives has been continued. Hill's, Trauzl's, the photographic, and the lead-disk methods have all been the subject of repeated experiment. It is necessary in comparing other explosives with the service gun-cotton that the latter shall be in the condition in which it is issued, and of the methods tried, that with the lead disk seems best suited to our purposes. The conditions to be observed in making this test have been reported already to the Bureau, but it is worth while to repeat them here.

The lead disks to be of "drawn" lead, to be truly cylindrical, with their faces smoothed off true and parallel, and to measure 3⅛ inches in diameter and 2 inches in height.

The iron disks to be of the best Norway iron, piled horizontally under the hammer, to be trued on their cylindrical and basal surfaces, to be free from cracks and other imperfections, and to measure 4⅛ inches in diameter and 2⅛ inches in height. The weights of each of these disks should not vary from the average by more than 20 grams.

The support to consist of a block of iron 2 feet square and 6 inches thick, to be buried 5 inches in the ground, and supported on a solid foundation; the exposed face to be trued off.

In making the test the lead disk is to be placed on the iron anvil, the iron disk to be placed on the lead disk, and the gun-cotton block on the iron disk, and all centered so that their axes are in the same line. A service detonator is to be inserted in the upper part of the hole in the gun-cotton block, so that the lower turn of the screw-thread shall be flush with the upper surface of the gun-cotton block, and wedged tightly in place with a small wooden wedge.

For steam-dried gun-cotton 2-inch block the lead disk should show, after firing, a compression of not less than $\frac{34}{64}$ inch and an extension of not less than $\frac{28}{64}$ inch.

For air-dried gun-cotton the lead disk should show a compression of not less than 33/64 inch and an extension of not less than 24/64 inch.

When other explosives which are in a granular or pasty condition are to be tested by this method, they should be contained in thin paper boxes, having the same form and area of base as the 2-inch gun cotton block. A long series of experiments has shown that with the weight of charge used and under the conditions of the experiment the damping effect of the paper is imperceptible.

In testing the sensitiveness of explosive substances, a quantitative comparison among them has been made by the "influence" method. For this purpose 100 grams of air-dry gun-cotton fired upon an iron plate is used as the standard initial agent. The results of tests applied to most of the explosives in use is a distinct and different limit of distance from the initial mass at which each of the substances can be detonated, and that if this limit, which we may call the "critical point," be exceeded by even a fraction of an inch, the secondary mass is not exploded.

GUN-COTTON.

The continued inspection of gun-cotton returned from ships going out of commission, after long exposure to conditions of service in all climates, has as yet failed to furnish a single instance of even incipient decomposition. This fact can not but confirm our belief in the stability and permanency of the gun-cotton manufactured at the station and issued to the service. It is noteworthy that, as a general rule, gun-cotton returned from a cruise will stand subjection to a high temperature longer than the freshly made product.

Very careful determinations have been made of the weight and volume of more than one hundred blocks of compressed gun-cotton both in the "steam-dried" and the "air-dried" condition, from which the gravimetric densities were calculated. The mean of all the results is as follows:

Gravimetric density:

Steam-dry block (excluding hole for detonator)	1.287
Steam-dry block (including hole for detonator)	1.050
Air-dry block (including hole for detonator)	1.073

The possibility of detonating gun-cotton by ignition when closely confined has never heretofore been determined. A series of experiments has been made in which the gun-cotton was confined in steel envelopes varying in thickness from three-eighths inch to 1½ inches. The gun-cotton was in some cases compressed, in others it was in a finely divided pulverulent condition. In no case was detonation accomplished, and the conclusion has been reached that detonation is impossible under such conditions.

There is on hand at that date 9,500 pounds of gun-cotton of the service pattern ready for issue, in addition to which there is 2,000 of old patterns, which will be reworked and pressed into the service blocks. Seven hundred and twenty-five pounds of old cotton have been reworked during the year.

The Bureau has recently directed quarterly reports to be made by inspectors of ordnance at the navy-yards, of the gun-cotton on hand at the different yards. When the reports for the last quarter are received it is my intention to ask that such gun-cotton as has been stored for any length of time, or is of old pattern, be returned to the station.

One hundred pounds of gun-cotton have been supplied to the artillery school at Fortress Monroe, and a small quantity has been furnished to the Frankford Arsenal for experimental purposes.

Three projectiles for the pneumatic guns of the *Vesuvius* have been fitted with charges, aggregating about 600 pounds. The work of shaping these charges to fit the projectiles suggested the use of a band-saw for the purpose, and one has since been set up. Charges for the magazines of automobile torpedoes may be shaped by this means out of the service blocks, although experience may show that a more convenient form may become necessary.

SMOKELESS POWDERS.

One of the most notable of recent advances in explosives has been the adoption by the principal European powers of smokeless powders for the purposes of warfare. The advantages which would result from the use of such powders was recognized many years ago. Early in the history of gun-cotten, the smokeless character of its explosion attracted attention and repeated efforts were made to use it as a propelling agent. These efforts resulted in failure, it being found impossible to so modify the violence of the explosion, by mechanical treatment of the gun-cotton, as to render it suitable to the purpose. Subsequently some success was realized by mixing with the gun-cotton unnitrated bodies, or by using only partially nitrated cellulose, these bodies retarding the combustion. These powders required the addition of a metallic nitrate as an oxidizing agent. They have been in use for some years for sporting purposes, but they are lacking the qualities of permanency, reliability, and accuracy which are essential in a military powder.

The discovery of the remarkable substance known as "celluloid" has suggested a new method for the treatment of gun-cotton for the production of powders, and this method has been adopted in the manufacture of most of the smokeless powders proposed for use within the last few years. It has been found that a considerable number of organic substances may be employed for producing the gelatinization of the gun-cotton, while a much larger number may be used to diminish the speed of combustion. To adjust the speed of combustion to the desired rate oxidizing agents are introduced, and for this purpose nitro-glycerine is found to be the most reliable. The mass, after thorough mixing is effected, is rolled into sheets or formed into cords and is finally cut up into grains of the proper size.

In addition to smokelessness, a successful smokeless powder must possess those qualities which characterize the best gun-powders, viz, progressive rate of burning, complete combustion of the charge within the gun, uniformity in action, and the minimum interior pressure with the maximum initial velocity. These qualities must be sought for by reproducing in smokeless powders those features which experience has shown impart the desired qualities to gunpowder. These are great hardness, high density, freedom from dust and from superficial irregularities, uniformity in size and shape of grains, complete physical and chemical homogeneity, and perfect stability.

Unfortunately in practice these conditions have not yet all been satisfied. From current reports from those countries where smokeless powders have been tentatively adopted, and from chemical examination of several of these powders at this station, they are found to fail in two important particulars; first, in complete homogeneity, and, second, in perfect stability. The lack of stability is to be expected where substances, which are more or less volatile under ordinary conditions, form part of the mixture. Unless the charges are hermetically sealed they are bound to change, and the pressures and velocities which they produce in practice may be entirely different from those obtained in proving them.

It is possible that such changes may take place even when the charges are closely confined. It is to be noted that the majority of these powders have a nitro-cotton base, while some are closely analogous in composition to explosive gelatine, and the stability of both of these bodies is yet a matter of doubt. On the other hand, it should be said that celluloid has been manufactured in considerable quantities for many years, and no instance of its spontaneous decomposition has been observed.

This station has been content with the examination of the foreign powders. Experiments have been made with compositions of our own in which the qualities noted above have been sought. These experiments have been conducted on a small scale, but the results have been encouraging, and arrangements are now being made for proceeding on a larger scale. The development of such a powder must, however, necessarily be very slow, as any hasty conclusion, based on a few favorable results, might lead to disaster.

ELECTRICAL LABORATORY.

The work in the electrical laboratory has included the regular duties connected with the maintenance and use of the electric light plant for lighting the buildings grounds, wharves, etc., and the inspection of wires, cables, and other electrical apparatus.

The construction of the search-light apparatus for the *Charleston*, the *Baltimore*, and the *Philadelphia* was done by the Thomson-Houston Electric Company, under the supervision and inspection of this station. The earnest efforts of the contractors to bestow upon this apparatus all the good qualities that their own experience and that of the inspecting officer suggested, was very noticeable. The result was efficient apparatus of American construction quite equal to, and in some respects superior to, any produced elsewhere.

The electric-alarm signal system, for fire signals and other purposes, embracing all the shops, offices, quarters, etc., of the station, has been reorganized and changed so that its efficiency and reliability have been greatly improved. In this system sixteen vibrating alarm bells are included in one series circuit extending around the station. Each bell had individual adjustments and action, similar to that of the ordinary vibrating bells. The continuity of the circuit can be tested without ringing the alarm, and bells of different sizes and rates of vibration can be operated in the same circuit. This system seems well adapted for use in the general-alarm circuits of ships.

A compact form of firing battery has been constructed for special use with naval mines and torpedoes.

An experimental apparatus for signaling ranges, etc., from the conning tower, or other central station, to the gun positions, has been developed and seems capable of satisfactory service. The apparatus is in process of construction.

A combination of apparatus has been made by which the indications of a voltmeter are automatically repeated and recorded at a distant point.

Preparations have been made for the installation of a storage battery for experimental and testing purposes.

A single cylinder, vertical engine, has been combined with a dynamo, on the same bed plate, the driving connection being made by the Evans friction belts and pulleys, the speed of the dynamo pulley being about twice that of the engine. This makes a compact arrangement of dynamo and engine, allows the use of a moderate-speed engine with a dynamo of high speed, and obviates the necessity of a flexible coupling. It also affords fairly good insulation for engine and dynamo connection.

With a view to developing a dynamo for launches and torpedo-boats, a new pattern Dow turbo-motor has been combined with a Parsons dynamo. The substitution of this motor for the Parsons motor makes a large reduction in the weight and in the space occupied, but at present it has rather a low steam efficiency and it makes a loud humming noise like its predecessor. Experiments are continuing for the reduction of the noise. Both motor and dynamo are run at a speed of about ten thousand revolutions per minute. The action of the Parsons governor for controlling the voltage at the terminals of the dynamo is found to be very satisfactory.

A good feature of this motor is its almost absolute immunity from damage by water coming over with the steam. It can, therefore, be quickly started, with no delay for draining, warming up, etc. After some improvement this apparatus might prove useful for certain purposes where compactness, simplicity, close governing, and freedom from injury by water in the steam supply would be valuable features.

During the trials of the torpedo-boat, *Cushing*, in March last, Lieutenant McLean, who was a member of the trial board, arranged, out of material belonging to the station, an apparatus for recording the revolutions of the engines, together with the time intervals in passing over the measured mile course. He describes the arrangement as follows:

"An apparatus was prepared for the continuous registration of the revolutions of the screws of the torpedo boat *Cushing*, together with the seconds' intervals of time as shown by a break circuit chronometer, and the times at which the boat crossed the range line at the ends of the measured mile course as marked by three independent circuit closing keys (for three independent observers). The design included the feature of accurate determination of rates of revolutions of the screws at the times of taking indicator cards of the engines. The design and arrangement of the parts was simple. The revolution registering circuits were completed at the shafts by pieces of sheet brass attached to circular wooden sectors secured on the shafts. These devices were very simple and efficient. They could be securely lashed or clamped to the shafts in a few minutes. The arrangement of circuits, etc., for registering the seconds' beats of the chronometer and the time marks of the observations, in lines parallel to and contiguous to the lines of the marks registering the revolutions of the screws, were similar to the arrangements used for transmission of naval observatory time signals and registrations of time comparisons with them.

"This apparatus was not specially designed for such work, but was a combination of existing apparatus and was prepared for use in these trials to demonstrate the practicability and efficiency of such means of obtaining and registering the required data as had been proposed to the Navy Department, from the same source, several years before. The apparatus was used with satisfactory results in March last by the board appointed by the honorable Secretary of the Navy to conduct and report upon the tests of the *Cushing* before her acceptance from the contractors. The installations of such apparatus on any steamer is very easily made, and it comprises very simple circuit closers on the screw shafts, a box for the battery, and a small table for the registering apparatus (chronometer and chronograph), which can be placed in a charthouse or any other convenient positions in the ship easily accessible to the members of the trial board and the contractor's representative; several circuit closer keys, or push buttons, in the hands of observers at any convenient positions, and such lengths of ordinary insulated wires as would be required to complete the circuits. The wires would not require battens or any other features of permanent leads."

INSTRUCTION.

For the first time in the history of the station no officers were ordered for instruction the past summer. While this was due to a lack of available officers rather than to any settled policy, it is a question whether it may not be to the advantage both of the station and of the service if the whole system of instruction of officers be changed. The results heretofore obtained have never been commensurate with the time and labor devoted to instruction. It has happened every year within my experience that some officers have come to the station for instruction against their own wishes. They have attended the lectures listlessly, and their performance of the so-called "practical work" has been perfunctory. They have gone again into the service with the reputation of having taken the course at the Torpedo Station, while their knowledge of the subject was extremely limited, and the reputation of the station has suffered accordingly. If a smaller number of officers were ordered to the station annually for one year, to take part in the experimental work of the station, and to do their own thinking under the guidance of the officers of the station, I believe the results would be much more satisfactory. No officer should be ordered to this duty who shall not, either by his general reputation in the service or by special examination, demonstrate his fitness and preparation for the work. It should be a privilege to take the course—a privilege to be granted to the few rather than to the many—and it should be confined to the junior grades of officers.

To supply an incentive to assiduous work, the fact that an officer has qualified himself for torpedo work should be taken into consideration in his subsequent assignment to duty. The introduction of modern ordnance on board ship, with its somewhat complicated and specialized apparatus, will necessitate, at no distant day, the supervision of an expert officer, who shall have no other duties to perform than those connected with the care and preservation of the ordnance material, and a knowledge of torpedo work should form a considerable part of the qualifications of such an expert.

The instruction of the enlisted men has been somewhat systematized within the past year, but much remains to be done in this direction, which can only be accomplished when some definited plan of detailing men for instruction is adopted. There is at present no regularity of assignment; two or three men will arrive this week, none the next, one the week after, and so on. If a detail of twelve men could be made on the first day of the months of March, June, September, and December, or as near these dates as may be, a great improvement could be effected. Each detail remaining six months under instruction there would be twenty-four men under instruction at all times, as large a number as can be handled properly. Each detachment would be at the station in months when diving can be carried on, and there would always be twelve men partially instructed who would be of value in the instruction of the others.

The average number of enlisted men under instruction during the year is twenty-seven. The twenty-six weeks ot the course are distributed as follows: torpedoes and torpedo work, eleven weeks; electricity, care of dynamos, etc., eight weeks; manufacture and care of gun-cotton, two weeks; diving, three weeks; fuse making, two weeks.

Regular night watches are stood in the dynamo room throughout the entire course, and it is worthy of remark that there is no attendance in the dynamo room other than that of the seamen under instruction.

The course of instruction of the seamen in electrical work has been the subject of considerable criticism. It is said that, having qualified themselves at the station, they leave the service and obtain electrical work on shore. Inquiry, however, shows that comparatively few of the men who have left the service after their instruction here have gone into electrical establishments. Those who do so are bright men who, under present conditions, would not stay in the service even if they had not this instruction. The constant idea in the course is to give the men as much practical experience as possible with such electrical apparatus as is used in the service. This experience has been made to extend to such testing and repairing as is necessary for those having the care of such apparatus, for putting it in operation whether it be for gun-firing circuits, torpedo or mine circuits, in which faulty connections might lead to accident or failure in action, or the management of search-light apparatus and apparatus for general illuminating purposes. The number and importance of electrical applications, in connection with ordnance material, are constantly increasing. The changes in material and methods will have to be accepted, and with them comes the necessity for the employment of quick, intelligent, and good all-around men, such men as could make a respectable living on shore. These men will not stay in the service, no matter under what conditions they entered it, unless their rate, position, pay, etc., are fairly commensurate with their duties and capacities.

More attention has been paid to the instruction in diving than heretofore. The building of the marine railways and the repair of the water-main from Newport have afforded opportunities of doing practical work of a useful character, which has been eagerly availed of by the men. There are few, if any, of the men who have left the station within the past six months who are not perfectly qualified to do all the diving that would ordinarily be required in a vessel of war.

It is extremely gratifying to note the excellent character of the men sent here for instruction. Many of them are former apprentices, and, with very few exceptions, they are men of high intelligence, very attentive to their duties and altogether creditable to the service.

TIME BALL.

The time ball has been dropped with great uniformity daily at noon of the 75th meridian, by currents received from the Naval Observatory at Washington, over the lines of the Western Union Telegraph Company. Chronographic records have also been made of comparisons of the mean time break-circuit chronometer of the station with the Observatory time signals.

The accurate transmission of time signals over long telegraph circuits, in which are included various cables, translators, and repeaters, which must have varying adjustments to suit the different conditions of the lines, variations in play of armatures, in effects of inductions, etc., is a more difficult matter than is generally supposed. If the difficulties due to the causes mentioned could be eliminated the error in transmission would be very small and constant. It is due to the harmonious co-operation of the manager of the Western Union office at Newport, with which the cable and land lines from this station connect, that the time-ball service has been as regular and reliable as possible under existing conditions.

Monthly reports from the station furnish the Naval Observatory with much information in regard to the character of the signals received over the telegraph lines, the value of which has been recognized by the Superintendent of the Observatory. This is the only point connected with the Observatory time system where such records are made and reported.

LIBRARY.

The number of books in the library is 2,596, an increase of 506 during the past year. A large proportion of this increase has been secured by exchanges, but both in purchasing and exchanging the policy has been to complete, as far as possible, sets of scientific and technical periodicals bearing upon the professional work of the station. There are still on hand many incomplete volumes of different periodicals, and efforts are being made to secure the missing numbers and have the volumes bound. Until this is done the odd numbers are in danger of being mislaid or injured, and as they can not well be catalogued until the completed volumes are secured, their usefulness and accessibility is much impaired. We are specially dependent upon our library for professional periodical literature, as the libraries of Newport are entirely lacking in this respect.

The card catalogue of books in the library numbers 2,718. The topical catalogue of current periodical literature, in which only those subjects which bear upon the work of the station are indexed, numbers, 8,713 cards.

Professor Munroe has very acceptably performed the duties of librarian in addition to his other work.

SANITARY CONDITION.

The only sanitary defect at the station, the termination of the sewer pipes but a short distance beyond the sea-wall, has been removed by carrying the sewer outlets into deep water. The health of officers, employés, and enlisted men has been good, the general physical condition of the latter being excellent. During the prevalence of the epidemic of influenza in the winter and early spring the cases on the island were few and, in every instance, mild in character.

Very respectfully,

THEO. F. JEWELL,
Commander, U. S. Navy, Inspector of
Ordnance, in charge of Station.

The CHIEF OF THE BUREAU OF ORDNANCE,
Navy Department, Washington, D. C.

REPORT OF THE BOARD ON THE COMPETITIVE TRIAL OF ARMOR PLATES.

NAVAL ORDNANCE PROVING-GROUND,
Annapolis, Md., October 11, 1890.

In obedience to the Department's order of July 11, 1890, the Board met at the naval ordnance proving-ground, September 18, 1890, for the purpose of conducting a competitive test of three armor plates, one of steel and one of nickel-steel, manufactured by Schneider & Co., Le Creusot, and one compound plate manufactured by Cammell & Co., Sheffield.

The Board made a careful preliminary inspection of the plates and their bolts and backing. They were all erected in accordance with a drawing furnished by the Bureau of ordnance to the inspector of ordnance in charge at the proving-ground. The steel plate and nickel-steel plate were secured to the backing with twelve bolts 2.36 inches diameter. The compound plate was secured to its backing by eight bolts 3.19 inches in diameter.

Plate.	No. of bolts.	Diameter of bolts.	Total bolt cross-section.	Weight of plate.	Bolt section per ton of plate.
			Sq. in.	*Pounds.*	*Sq. in.*
Steel	12	2.36″	52.29	*20,776	5.66
Nickel-steel	12	2.36″	52.59	*20,679	5.69
Compound	8	3.19″	64.32	†20,992	6.86

*Actual. † Calculated.

The plans of the backing, the arrangement, shapes, and methods of securing the armor bolts are shown in the photographs appended.

Caliper measurements were taken by Lieutenant-Commander Dayton, along the edges of the plates before they were secured. A table of these is appended.

Caliper measurements of armor plates.

[Commencing at lower right-hand corner, up right edge, across top and down left side, at intervals of 1 foot.]

Point of measurement.		Schneider, all steel.	Schneider, nickel-steel.	Compound.
		Inches.	*Inches.*	*Inches.*
Lower right corner		10.56	10.22	10.65
Right side	1	.61	.45	.63
	2	.61	.65	.76
	3	.58	.65	.81
	4	.53	.64	.70
	5	.52	.49	.76
	6	.51	.45	.80
	7	.53	.38	.70
Upper right corner		.55	.24	.70
Top	1	.59	.38	.69
	2	.60	.41	.71
	3	.61	.41	.77
	4	.63	.41	.75
	5	.63	.38	.74
Upper left corner		.55	.27	.67
	1	.56	.34	.70
	2	.51	.38	.59
	3	.55	.42	.67
	4	.53	.43	.71
	5	.58	.43	.67
	6	.63	.41	.69
	7	.63	.57	.76
Lower left corner		.50	.37	.76
	1	....	....	.83
	2	....	....	.82
	3	....	.30	.75
	4	....	....	.76
	5	....	....	.73
Mean		10.57	10.42	10.72

The surfaces of the plates were scoured clean.

The plates were arranged on chords of a circle with the gun pivot as the center and the muzzle of the gun 28 feet distant from the center of the plate towards which it was pointed, the axis of the gun being then normal to the surface of each plate.

The gun used was a 6-inch B. L. R., Mark III, 35 calibers long, mounted on a service center pivot carriage. The charge used was 44½ pounds for each round; brown prismatic powder manufactured by Messrs. Du Pont. The striking velocity was 2,075 feet per second.

The projectiles were all Holtzer 6-inch armor piercing shell, with ogival of 2 calibers radius, and were brought up to the standard weight of 100 pounds by filling them with sand and fragments of iron. These fragments of iron weighed about 2 ounces each.

The gun was mounted on a heavy wooden platform protected by a structure of timber roofed with iron plates and a pile of sand bags in front, through which the muzzle projected.

The pointing was done by means of central cross hair sights in the axis of the bore.

Bomb-proofs had been erected at convenient places on the grounds. The one nearest the gun, at a distance of 50 feet protected the firing party. The gun was fired by means of friction primer and a long lanyard.

The Board caused photographs to be taken of each plate before and after each shot; of all three plates in a group after four shots each, and also after five shots each; of the recovered projectiles and of such fragments of plate as could be identified.

At 11 a. m. the Board began the firing trial.

Round 1.

FIRST SHOT AT THE STEEL PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 59′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2075 foot-seconds.

Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the bottom and 24 inches from the right-hand edge of the plate. The projectile entered and remained in the plate with its base projecting 6.50 inches, and its body apparently intact. A bulge 1 inch high and 17.5 inches diameter was raised on the face of the plate, with a well-developed fringe projecting 1 inch. The visible portion of the hole in the plate was funnel-shaped, extending to a depth of 3 or 4 inches. Six short radial surface cracks were produced in the bulge. One small piece of fringe scaled off.

The side plates were uninjured, one bolt slightly started. The backing was undisturbed, and no bolts were started. The rotating band was stripped off the projectile. Its base-plug could still be easily turned. (Photograph No. 4.)

Round 2.

FIRST SHOT AT THE COMPOUND PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.

Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the right-hand edge and 24 inches from the bottom of the plate. The projectile perforated the plate and lodged in the backing, with its base at a distance of 21.5 inches from the face of the plate. Eight fine radial cracks were produced, varying in length from 24.5 to 55 inches from the center of the hole. One of these extended to the right edge of plate, at which point it seemed to extend through the steel face. The right-hand corner of the plate, along the through crack mentioned above, was set out to a distance of .10 inch. The steel face around the hole was scaled off to a diameter of from 14.5 to 19 inches, and to a depth of from 1.3 to 2.25 inches. The interior of the shot hole showed a rough surface.

The side plates were uninjured. Two bolts of right-side plate near point of impact were slightly started. One tie-bolt of the backing, about 8 inches from the point of impact, was started 5 inches to the rear. The rear side of bolt-heads in first row of vertical bolts started one-tenth of an inch from the braces.

The two inner lower braces of the backing were started upwards and backwards .25 inch. The projectile remained buried in the backing with its face visible through the hole. (Photograph No. 5.)

Round 3.

FIRST SHOT AT THE NICKEL-STEEL PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.
Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.
Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the right-hand edge and 24 inches from the bottom of the plate. The body of the projectile remained in the plate. The rear end, 7.5 inches long, broke off at a distance of 4 inches in from the face of the plate and rebounded 30 feet to the front. A front bulge was raised 17 inches in diameter and 1.25 inches high. There was no fringe.

Two short radial surface cracks were produced in the bulge. A small piece of the bulge, 1 inch deep, was scaled off from the side of the shot hole.

The side plates were uninjured. The head of one bolt was split in two.

The bolt in backing nearest the point of impact was driven 30 inches to the rear. The backing was undisturbed. (Photographs Nos. 6 and 17.)

Round 4.

SECOND SHOT AT THE STEEL PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.
Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.
Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the left-hand edge, and 24 inches from the bottom of the plate. The projectile penetrated to a depth of 12 inches and rebounded entire to a distance of 26 feet to the front and 3 feet to the right. It was shortened .10 inch. A front bulge was raised 18.5 inches diameter and 1 inch high, with a well-developed fringe projecting .75 inch. Seven short radical cracks were developed in the bulge, two of them being connected by two short surface hair cracks. One small piece of fringe scaled off. The shot hole was regular with a smooth surface, and showing star-shaped cracks at inner extremity.

The side plates were uninjured. Two bolts were started. One nut of a side-plate bolt was broken off. The backing was undisturbed. (Photographs Nos. 7 and 17.)

Round 5.

SECOND SHOT AT THE COMPOUND PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.
Projectile.—Holtzer A. P. shell, 100 pounds, Striking velocity, 2,075 foot-seconds.
Charge.—44½ pounds brown prism. Striking energy, 2,998 foot-tons.

The point of impact was 24 inches from the left-hand edge and 24 inches from the bottom of the plate. The projectile perforated the plate and lodged in the backing with its base visible at a distance of 15 inches from the face of the plate. The steel face was scaled off the plate around the shot hole irregularly to an average diameter of 14 inches and depth of 1.25 inches.

Six radial cracks were produced, all extending to the edges of the plate and apparently quite deep. A surface crack was produced about 3.5 feet above lower edge of plate extending nearly across the plate.

Two connecting radical cracks produced by the first shot deepened and were extended entirely across the plate through both shot holes, throwing out the lower part of the plate from .6 inch to 1.8 inches. Where this crack reached the right edge of the plate the steel face showed a vertical curved fracture of a minimum thickness of .3 inch and separated 1.9 inches at the top.

The interior surface of the shot hole was rough and broken, showing a disintegration of the metal, many small loose fragments of which were lying in the hole. The cracks developed by the preceding shot were all increased in size, the lower part of the plate being much racked.

The side plates were uninjured. Two bolts were slightly started.

The backing showed but slight set-back. One tie-bolt in backing nearest impact was driven 4 inches to the rear. The rear side of bolt-heads of first vertical row was started .10 inch from the braces. (Photograph No. 8.)

Round 6.

SECOND SHOT AT THE NICKEL-STEEL PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.

Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the left-hand edge, and 24 inches from the bottom of the plate. The projectile penetrated and remained in the plate apparently intact, its base projecting 1.6 inches. The rotating band was still in place, but sheared flush with the body of the shell.

A front bulge was thrown up 16 inches in diameter and 1.10 inches high. A piece was scaled off for about two-thirds the circumference of the bulge of an average diameter of 12.55 inches and average depth of 1.10 inches.

The side plates were uninjured, two bolts slightly started. The backing was uninjured. The tie-bolt nearest the point of impact was driven 12 inches to the rear. (Photograph No. 9.)

Round 7.

THIRD SHOT AT THE STEEL PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.

Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the right-hand edge and 24 inches from the top of the plate. The projectile penetrated to a depth of 12.5 inches and rebounded entire to a distance of 30 feet. It was shortened .14 inch and the diameter of the bourrelet was increased .01 inch.

A front bulge was found 18.5 inches diameter, and 1 inch high, with a well-developed fringe projecting 1 inch. Five short radial surface cracks were developed in the bulge, and two small pieces of the fringe were scaled off. The shot hole was smooth and regular, showing star-shaped cracks at its inner extremity.

The side plates were uninjured; one piece of bolt 7 inches long was broken off and thrown out to the front. The backing and its bolts were undisturbed. (Photographs Nos. 10 and 17.)

Round 8.

THIRD SHOT AT THE COMPOUND PLATE.

Gun.—6-inch B. L. R. Elevation 2° 50′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.

Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from right-hand edge and 24 inches from the top of the plate. The projectile perforated the plate and lodged in the backing, with its base 23.75 inches from the face of the plate.

Ten deep radial cracks were produced, some of them being connected by cross cracks. A large piece of steel face in upper right-hand corner was slightly separated from the wrought-iron back, and a smaller piece was in the same condition below the shot hole.

Old cracks in lower part of plate were increased in size, and the face of the plate was quite shattered.

The interior surface of the shot hole was rough and broken, showing disintegration of the surrounding metal, many small fragments of which had been shaken off and were lying in the hole.

The side plates were not injured. The nuts of five bolts in the left side plate were unscrewed from .25 inch to .50 inch.

The backing was uninjured. (Photograph No. 11.)

Round 9.

THIRD SHOT AT THE NICKEL-STEEL PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.

Charge.—44½ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the right-hand edge and 24 inches from the top of the plate. The projectile penetrated and remained in the plate apparently intact, its base projecting 4.5 inches and its rotating band half torn off. A front bulge was raised 18 inches in diameter and 1.5 inches high.

Two very short radial surface cracks were produced in the bulge. Two small pieces scaled out of bulge. The side plates were uninjured; the bolt-heads were slightly bent.

The backing was undisturbed and no bolts were started. (Photograph No. 12.)

Round 10.

FOURTH SHOT AT THE STEEL PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.

Charge.—44¼ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the left-hand edge and 24 inches from the top of the plate. The projectile penetrated to a depth of 12.5 inches and rebounded, breaking into three large and several small pieces. The head was entire, the body in halves, the transverse break at 7 inches from the base of shell.

A front bulge was raised 17 inches diameter and 1 inch high, with a well-developed fringe projecting 1 inch.

Six short radial surface cracks were produced in the bulge, and one small piece of the fringe was scaled off. The surface of shot hole was smooth and regular, showing star-shaped cracks at its inner extremity.

The side plates were uninjured.

The backing was undisturbed. One bolt, broken by previous shot, was driven to the rear 2 inches. (Photographs Nos. 13 and 17.)

Round 11.

FOURTH SHOT AT THE COMPOUND PLATE.

Gun.—6-inch B. L. R. Elevation, 2° 50′.

Projectile.—Holtzer A. P. shell, 100 pounds. Striking velocity, 2,075 foot-seconds.

Charge.—44¼ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the left-hand edge and 24 inches from the top of plate. The projectile perforated plate and backing, breaking into three large and several small pieces. The largest piece passed over the earth backing and lodged in the butt, 60 feet away.

Three deep cracks were developed below shot hole. All the steel face above this and the preceding shot hole separated from the wrought-iron back, and the greater part of it was thrown off in seven large and many small fragments, the larger fragments weighing, respectively, 29, 58, 92, 125, 178, and 380 pounds.

A part of the steel face below the preceding shot-hole separated from the wrought-iron back and was thrown off.

All previous cracks widened.

That part of the wrought-iron back which was exposed on the upper part of the plate showed a rough, broken appearance and contained three narrow cracks. The shot-hole was very rough on the interior surface, showing much disintegration of the metal, with small fragments of which it was nearly filled.

The remainder of the plate was badly racked and showed seventeen large cracks through steel face. The side plates were uninjured.

There was an irregular hole torn in the backing by the shot. No bolts were started. (Photographs Nos. 14, 16, and 17.)

Round 12.

FOURTH SHOT AT THE NICKEL STEEL PLATE.

Gun—6 inch B. L. R. Elevation, 2° 50′.

Projectile—Holtzer A. P. shell, 100 pounds. Striking velocity, 2075 foot-seconds.

Charge—44¼ pounds brown prism. Striking energy, 2,988 foot-tons.

The point of impact was 24 inches from the left-hand edge and 24 inches from the top of the plate. The projectile broke 3.5 inches from face of plate and 6.5 inches from its base, its head remaining in the plate. The rear half rebounded 30 feet, burying itself in the sand-bags around the gun.

A front bulge was raised 16 inches diameter and 1 inch high. One fine crack was developed in the upper part of the bulge.

The visible interior surface of the whole was smooth and regular.

The side plates were uninjured; bolt-heads slightly bent. The backing was undisturbed and no bolts were started. (Photographs Nos. 15 and 17.)

After the preceding twelve rounds had been fired the Board adjourned for two days until an 8-inch gun, with which it was decided to continue the firing, could be mounted. The firing with this gun took place on Monday, September 22, 1890.

The gun was mounted on the same platform as the 6-inch, with its pivot 6¼ feet to the rear of the 6 inch pivot. The muzzle of the gun was 30 feet distant from the plates.

The charge was 85 pounds of brown prismatic powder, made by Du Pont. The striking velocity was 1,850 feet per second.

The projectiles were Firth armor-piercing shell, weighted to 210 pounds by filling them with sand.

Round 13.

FIFTH SHOT AT THE STEEL PLATE.

Gun—8 inch B. L. R. Elevation, 0° 00′.

Projectile—Firth A. P. shell, 210 pounds. Striking velocity, 1,850 foot-seconds.

Charge—85 pounds brown prism. Striking energy, 4,988 foot-tons.

The point of impact was at the center of the plate. The projectile penetrated to a depth of 15 inches and rebounded broken in three large pieces. A front bulge was raised 21 inches in diameter and 1 inch high. There was no fringe. A piece scaled off from the lower right-hand edge of hole radially for 5 inches.

Four through cracks, radiating from the shot-hole were developed, two above and two below, each one extending diagonally through one of the 6-inch shot-holes to top and bottom of face respectively, and forming an irregular shaped X. These cracks above the center hole varied in width from .25 to .50 inches, and below the center hole from .16 to .50 inches.

The upper right hand crack reached the top at a point 13 inches from the side. The upper left hand crack reached the top 5.5 inches from the side. The lower right-hand crack reached the bottom 13.25 inches from the side, and the lower left hand crack reached the bottom 8 inches from the side of the plate.

The side plates were uninjured and the bolts intact.

The backing was driven back bodily .10 inches. (Photographs Nos. 19, 22, and 23.)

Round 14.

FIFTH SHOT AT THE NICKEL STEEL PLATE.

Gun—8 inch B. L. R. Elevation, 0° 00′.

Projectile—Firth A. P. shell, 210 pounds. Striking velocity, 1,850 foot-seconds.

Charge—85 pounds brown prism. Striking energy, 4,988 foot-tons.

The point of impact was the center of the plate. The projectile entered and broke 5.25 inches from the face of plate, part of the head remaining in the hole.

A front bulge was raised 16.5 inches in diameter and .25 inches high. The circumference of the hole was scaled out to the following radial distances from the center:

At top, 7 inches out, maximum depth 4 inches.
At right side, 6 inches out, maximum depth 2 inches.
At bottom, 6.5 inches out, maximum depth 2 inches.
At left side, 7.25 inches out, maximum depth, 4 inches.

A hole of considerable length was visible on the side of the interior of the hole between the projectile and interior surface of the plate.

There were no cracks visible on the plate.

The side plates were uninjured and no bolts were started.

The front timber of the backing in the line of the shot-hole was apparently broken in two.

The fragments of projectile that were recovered are shown in the photograph. (Photographs Nos. 20, 22, and 23.)

Round 15.

FIFTH SHOT AT THE COMPOUND PLATE.

Gun—8 inch B. L. R. Elevation, 0° 00′.

Projectile—Firth A. P. shell, 210 pounds. Striking velocity, 1,850 foot-seconds.

Charge—85 pounds brown prism. Striking energy, 4,988 foot-tons.

The point of impact was the center of the plate. The projectile perforated the plate and backing and disintegrated much of the metal about the hole. Most of the front plate was scaled off in twenty-four large and a great number of small pieces, the larger pieces varying in thickness from 3.75 to 5.50 inches.

Parts of the plate were left complete along each edge as shown in the photographs, but much of it separated, some of the fragments of the steel being nearly on the point of falling off. The exposed wrought-iron back showed eighteen cracks of varying length.

The metal about the interior of the hole was rough and broken. The wrought-iron surface was rough and irregular. The metal around all shot-holes showed considerable disintegration. Several concentric cracks appeared in the wrought-iron back about the 5-inch shot-hole.

The side plates were uninjured.

The projectile broke an irregular hole through the backing, but all damage was local.

The shell was recovered entire, having penetrated the earth backing about 15 feet. It was shortened .24 inches and the diameter of the bourrelet was increased .015 inches. (Photographs Nos. 21, 22, and 23.)

The Board then adjourned until the plates could be removed from the backing so as to expose to view their rear faces.

The Board met at the Naval Ordnance Proving Ground on October 10, 1890, and examined the backs of the plates and the fronts of the backing, with the following results:

BACK OF STEEL PLATE.

[Photographs Nos. 24 and 24a.]

No. 1 shot. Back bulge 3.5 inches high and 16 inches diameter.

No. 2 shot. Back bulge 3.0 inches high and 15 inches diameter.

No. 3 shot. Back bulge 2.6 inches high and 16 inches diameter, with a piece broken out.

No. 4 shot. Back bulge 2.6 inches high and 15 inches diameter.

No. 5 shot. Back bulge 6.25 inches high and 22 inches diameter, with two pieces broken out.

Diagonal cracks from front of plate all through to back.

BACKING OF STEEL PLATE.

[Photograph No. 25.]

No. 1 shot. Indented 2.75 inches.

No. 2 shot. Indented 2.40 inches.

No. 3 shot. Indented 2.00 inches, two pieces embedded in backing.

No. 4 shot. Indented 2.40 inches.

No. 5 shot. Indented 5.25 inches, and one piece embedded in the hole.

BACK OF NICKEL STEEL PLATE.

[Photographs Nos. 26 and 26a.]

No. 1 shot. Back bulge 5 inches high and 21 inches diameter.

No. 2 shot. Back bulge 6 inches high and 21 inches diameter.

No. 3 shot. Back bulge 4 inches high and 19 inches diameter.

No. 4 shot. Back bulge 4 inches high and 18 inches diameter.

No. 5 shot. A crater in back of plate was formed of an average depth of 3.5 inches and 21 inches diameter.

BACKING OF NICKEL STEEL PLATE.

[Photograph No. 27.]

No. 1 shot. Indented 5.25 inches.

No. 2 shot. Indented 4.75 inches.

No. 3 shot. Indented 3.50 inches.

No. 4 shot. Indented 3.50 inches.

No. 5 shot. A hole 10¼ inches deep in the wood and 6 inches deep to a fragment of metal left in the backing from the crater in the plate.

BACK OF COMPOUND PLATE.

[Photographs Nos. 28 and 28a.]

No. 1 shot. Back bulge 6.4 inches high and 20.5 inches diameter.

No. 2 shot. Back bulge 6.25 inches high and 18 inches diameter.

No. 3 shot. Back bulge 6 inches high and 20 inches diameter.

No. 4 shot. Back bulge 7.25 inches high and 19 inches diameter, a large piece of plate broken out.

No. 5 shot. Back bulge 7.5 inches high and 21 inches diameter, a piece of plate broken out.

BACKING OF COMPOUND PLATE.

[Photograph No. 29.]

No. 1 shot. Base of projectile 11 inches in from face of backing.
No. 2 shot. Base of projectile 4.75 inches in from face of backing.
No. 3 shot. Base of projectile 13.1 inches from face of backing.
No. 4 shot. Through hole: piece of plate embedded in side of hole.
No. 5 shot. Through hole: piece of plate embedded in side of hole.
No bolts in any of the plates were injured.

NOTE.—The word "front," when applied either to the plate or fragments of plate or projectile, refers to the side of the plate toward the gun.

The swellings of the plate caused by the striking of a projectile are denominated respectively the "front bulge" and the "back bulge."

Appended to the report will be found the chemical analyses of the metal of the plates and the minutes of the proceedings of the Board.

SUMMARY.

The compound plate was perforated by all projectiles, and its steel face was destroyed. Two of the shells passed completely through both plate and backing.

Both steel plates kept out all projectiles, the all-steel plate showing slightly greater resistance than the nickel steel plate, but the former was badly cracked by the 8-inch shell, while the latter remained uncracked. The Board therefore places the three plates tested in the following order of "relative merit:" 1. Nickel steel. 2. All steel. 3. Compound.

L. A. KIMBERLY,
Rear-Admiral, U. S. Navy,
President of the Board.
E. O. MATTHEWS,
Captain, U. S. Navy, Member.
W. R. BRIDGMAN,
Commander, U. S. Navy, Member.
W. MAYNARD,
Lt. Comdr., U. S. Navy, Member.
I. F. MEIGS,
Lieutenant, U. S. Navy, Member.
B. H. BUCKINGHAM,
Lieutenant, U. S. Navy, Member.
W. H. H. SOUTHERLAND,
Lieutenant, U. S. Navy, Member.
F. F. FLETCHER,
Lieutenant, U. S. Navy, Member.
PHILIP R. ALGER,
Ensign, U. S. Navy, Member.
A. A. ACKERMAN,
Ensign, U. S. Navy, Member.
ROBERT B. DASHIELL,
Ensign, U. S. Navy, Recorder.

REPORT

OF THE

CHIEF OF THE BUREAU OF CONSTRUCTION AND REPAIR.

NAVY DEPARTMENT,
BUREAU OF CONSTRUCTION AND REPAIR,
Washington, D. C., October 15, 1890.

SIR: In obedience to the Department's instructions, I have the honor to submit my annual report for the fiscal year ending June 30, 1890, showing the work performed and the amounts expended, together with the estimates for the fiscal year ending June 30, 1892.

The estimates for the expenses of the Bureau, as given in the statement marked A, are in accordance with existing laws.

The estimate marked B is for the general repair of vessels at navy-yards and on foreign stations, purchase of stores, materials, machinery, and tools of all kinds, preservation of material and stores, and for the general care and preservation of the Navy in the line of construction and repair.

The estimates in the statement marked C are for the pay of such clerks and writers at the several navy-yards as are indispensable for the proper and systematic prosecution of the work.

The estimate marked D is for the hulls and outfits of new vessels.

APPENDICES E, F, G, H, I, K, L, AND M.

Appendix E is a list of the vessels which have been repaired at the navy-yards during the fiscal year 1890–'91.

Appendix F is a list of the expenditures under the different appropriations during the year.

Appendix G is a statement of the amounts expended on new vessels under construction at the several navy-yards, and for outfit of other vessels the hull and machinery of which were built or are building under contract, also amounts expended for draughtsmen, copyists, writers, etc.

Appendix H shows the number of payments and the amounts thereof on account of the various vessels building under contract, and data relating to the laws under which they are built.

Appendix I is a list of the vessels of the Navy divided into groups under the heads of "Armored vessels," including single turreted monitors, "Unarmored steel vessels," "Torpedo boats," "Iron steam-vessels," "Wooden steam-vessels," "Wooden sailing vessels," "Tug-boats," and "Vessels unfit for sea service."

Appendix K contains reports from naval constructors, showing condition of work July 1, 1890, on vessels building or completing at navy-yards or under contract at private yards.

Appendix L contains supplementary reports showing progress of work from July 1 to October 1, 1890, on vessels building or completing at navy-yards or under contract at private yards. A report is also included showing the condition of the ship-building plant at the navy-yard, Mare Island, Cal.

Appendix M. The Bureau has deemed it advisable to attach to this report two statements considered valuable for reference, and covering much information which the Bureau has been required repeatedly to furnish, viz, the regular annual appropriations for purposes of the several bureaus of the Navy Department from March, 1883, to June, 1890, and annual appropriations for increase of the Navy from March, 1883, to June, 1890, with other useful data.

DRAUGHTING WORK IN THE BUREAU.

During the last year the work brought upon this branch of the Bureau has been particularly heavy.

The plans of the *Monterey* were entirely recast, due to a change in the battery; two complete sets of trace plans were made for armored cruiser No. 2, two for cruiser No. 6, two for a practice vessel for the Naval Academy, two for a harbor defense ram, two for steam tu three for the heavily armored coast-line battle-ships, two for the triple-screw cruiser No. 12, together with the specifications for all the above vessels.

The plans and specifications for a 22-knot torpedo cruis are be prepared, and with the letting of the contract for this v a fi class torpedo boat the Bureau will have finished all the rk au by recent legislation, so far as the designing is concer l.

CHIEF CLERK OF THE BUREAU.

The chief clerk, under the law, acts as Chief of the Bureau in case of the death, illness, resignation, or absence of that officer, and must be competent to take charge of the Bureau. The duties of this office are arduous, and fully deserve an increase of salary to $2,500 per ann which is earnestly recommended, and estimate is submitted accordingly,

ARMORED CRUISER MAINE.

The Bureau desires to express its appreciation of the rapidity with which the work has progressed on the United States steamer *Main* building at the navy-yard, New York, notwithstanding the delay which have occurred in the delivery of steel material. In a repor dated October 7, 1890 (see Appendix L), the naval constructor state that on October 1, 55 per cent. of the work, not including armor or alterations, was completed. The total expenditures for work on the hul of this vessel to October 1, 1890, were for labor, $570,265.15; material $171,415.20; total, $741,680.35—a very satisfactory showing indeed and one which enables the Bureau to state that there will be no question as to her completion within the limit of cost. The vessel will b ready to be launched November 18, 1890.

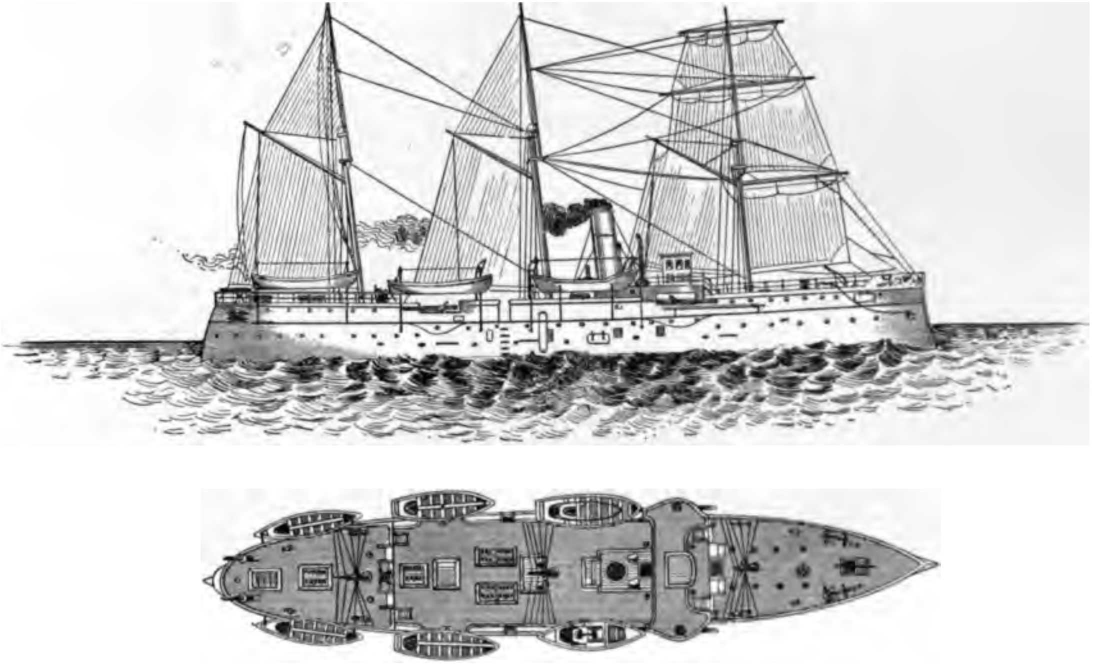
THE INTREPID.

As the boilers intended for the *Intrepid* have been put into anothe vessel, and as, in the opinion of this Bureau, it would not be expedien or in the interests of economy to rebuild her, it is recommended tha she be condemned and sold at public auction.

PRACTICE CRUISER.

BUREAU OF CONSTRUCTION AND REPAIR

NAVY DEPARTMENT. 1889.



She was hauled out on the ways at the navy-yard, New York, where she still remains, occupying a much needed space. The vessel is in a most dilapidated condition, with the frames and the few plates on the bottom so corroded as to be useless.

TUG-BOATS.

After the purchase of the *Triton* the three remaining tugs were advertised for on the Department's plans and specifications, the bids to be opened June 12, 1890. No bids were received on account of the steel requirements. They were re-advertised for September 3, 1890, the steel to be subject to the tests prescribed by the American Shipmasters' Association for vessels built of steel. Bids were received October 6, 1890, within the limits of the act authorizing their construction or purchase, and contracts have been awarded.

THE WOODEN VESSELS OF THE NAVY.

With the gradual appearance of the new steel navy has come the rapid retirement of the wooden fleet.

When the *Chicago*, *Boston*, *Atlanta*, and *Dolphin* were begun the serviceable wooden steam-vessels numbered, in all, thirty-seven; now there are eleven new steel vessels and one first-class torpedo-boat in commission and only eighteen wooden steam vessels.

In about seven years the wooden fleet will have practically disappeared, or have been utilized as receiving and training vessels.

At present we have of the second-rates the *Lancaster*, *Pensacola*, and *Omaha*. The third-rates are the *Swatara*, *Galena*, *Marion*, *Mohican*, *Iroquois*, *Kearsarge*, *Adams*, *Alliance*, *Essex*, *Enterprise*, *Nipsic*, *Tallapoosa*, *Thetis*, and *Yantic*. The *Dispatch* is the only fourth-rate now in existence.

The work of repairing the *Lancaster* for a gunnery training-ship, which was not begun till late in the fiscal year, did not progress rapidly, for the condition of the appropriation would not permit of the expending of a sum sufficient to carry on the work expeditiously. Since the 1st of July the work has been pushed and she is now rapidly approaching completion, and, with a battery of modern guns, will make an excellent gunnery training vessel. With her new boilers she can probably remain in service from eight to nine years.

The *Pensacola*, having been repaired and had new boilers placed in her, will probably last from four to five years longer.

The *Richmond* has been ordered to Newport for duty in connection with the training-station. She is now practically unserviceable for duty as a cruising man-of-war.

It is doubtful whether the *Omaha* will be worth repairing on return from present cruise.

The *Swatara* has been ordered to the navy-yard, Mare Island, and with slight repairs can probably continue in active service two or three years, at the expiration of which time, in the opinion of the Bureau, she can not be again repaired under the law.

The *Galena*, if repaired can be continued in service five or six years.

The *Marion*, when repairs are completed, will last about five years. The *Iroquois* and *Kearsarge* will last about two or three years. Having returned from her cruise in the Pacific, the *Adams* has been surveyed by the statutory board, the estimate for repairs to her hull being

$27,910. If this vessel is repaired she will continue in service five or six years longer.

The *Alliance* and *Thetis* may last three years, and the *Yantic* five or six years. The *Mohican* should last five years. The *Essex*, having been thoroughly repaired and having new boilers, will last five or six years longer. The *Enterprise*, having been overhauled at the navy-yard, New York, is probably good for three years longer. At the expiration of that time she will probably be condemned. Repairs were made on the *Nipsic* at Honolulu, sufficient to enable her to continue her cruise; at the present time she is at the navy-yard, Mare Island, and as the report of survey shows that it will cost $23,945, the Bureau is doubtful as to the expediency of repairing her. The *Tallapoosa* can not be repaired under the law, and will probably not be able to continue in service more than eight months. The *Dispatch* will probably last only a year, unless extensive repairs are made upon her.

SURVEYS.

The following-named vessels have been surveyed and repairs ordered during the fiscal year 1889-'90, at the estimated costs stated as follows:

Name of vessel.	Estimated cost of repairs.	Date of survey.	When and where repairs have been ordered made.
Alert	$11,255	Dec. 30, 1889	Jan. 24, 1890, Mare Island yard.
Alliance	31,494	Aug. 20, 1889	Aug. 22, 1889, Norfolk.
Boston	6,000	Aug. 22, 1889	Aug. 28, 1889, New York yard.
Enterprise	6,931	Mch. 25, 1890	Apr. 7, 1890, New York yard.
Essex	36,154	June 27, 1889	July 9, 1889, New York yard.
Independence	3,505	Jan. 10, 1890	Feb. 4, 1890, Mare Island yard.
Lancaster	4,600	Aug. 8, 1890	Aug. 11, 1890, Portsmouth yard.
Marion	53,347	June 16, 1890	June 25, 1890, Mare Island yard.
May Flower	24,000	Feb. 18, 1890	Repairs not ordered.
Minnesota	13,754	Mar. 12, 1890	Apr. 8, 1890, New York yard.
Monongahela	25,000	July 26, 1890	Sept. 3, 1889, Portsmouth yard.
Pensacola	14,677	June 13, 1890	June 23, 1890, New York yard.
Pinta	3,650	July 18, 1889	July 31, 1889, Mare Island yard.
Portsmouth	1,121	Nov. 15, 1889	Nov. 26, 1889, New York yard.
Ranger	4,335	July 17, 1889	July 31, 1889, Mare Island yard.
Thetis	6,638	Jan. 22, 1890	Feb. 13, 1890, Mare Island yard.
Triana	4,329	Mar. 24, 1890	July 18, 1890, New York yard.
Nipsic	26,157	Aug. 10, 1889	Repairs at Honolulu.

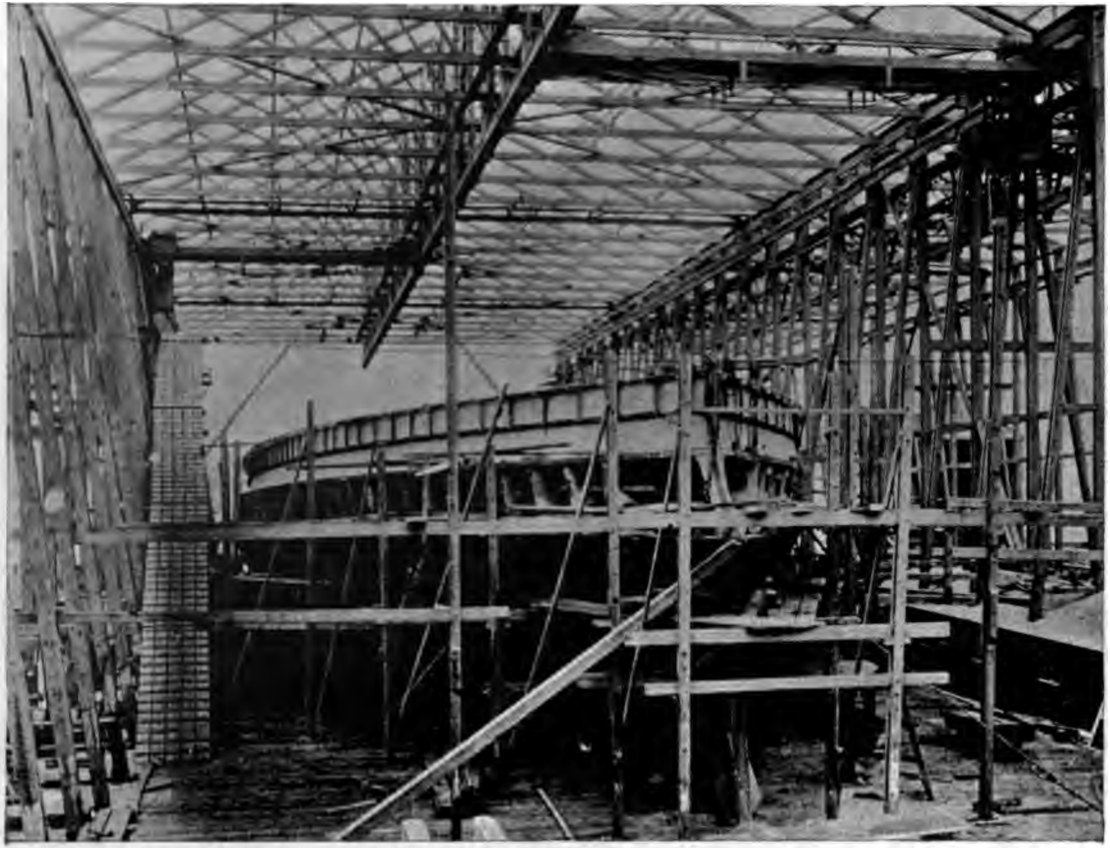
VESSELS CONDEMNED AND APPRAISED FOR SALE.

The following-named vessels have been surveyed, and upon the recommendation of the Bureau have been inspected and appraised for sale by the board of inspection and survey, the estimated cost of repairs having exceeded the 20 per cent. limit provided by the act of August 5, 1882. *Juniata* and *Quinnebaug* stricken from register November 21, 1889.

VESSELS CONDEMNED RECOMMENDED TO BE SOLD.

The following-named vessels having been surveyed and the cost of repairs ascertained to be in excess of the 20 per cent. limit, are recommended to be sold:

Brooklyn, *Saugus*, *Speedwell*, *Rescue*, *Ossipee*, *Juniata*, and *Quinnebaug*. The care of these vessels is a constant source of expense to this Bureau, and as they are of no service whatever, the best interests of the Government would be subserved by their immediate sale.



U. S. S. COAST DEFENSE VESSEL MONTEREY, OCTOBER, 1890.

NEW SHIPS OF THE NAVY.

The description which follows of new ships building or to be built for the Navy will show the great advance made in ship design and in the ship-building capacity of the country in the last five years. The vessels are the outcome of the conditions due to our coast line, our ocean commerce, and our position as a nation.

In the opinion of this Bureau the ideal commerce-destroyer has been attained in the design of cruiser No. 12. She has a sustained speed greater than that of the swiftest of the Atlantic "greyhounds," united with a powerful battery, immense coal endurance, and efficient protection.

U. S. S. MONTEREY.

Under date of November 19, 1889, the Department directed the Board of Bureau Chiefs to consider the armament of the coast-defense vessel *Monterey.*

The board reported November 22, 1889, as follows:

While the battery now assigned to the coast-defense vessel is in itself efficient, it is so heavy that the guns can not be adequately protected; moreover, the rate of fire of the 16-inch gun is comparatively slow.

As this vessel must meet powerful armored ships at close quarters in battle, it is considered that more perfect protection for the battery is essential, and the only way to obtain this on the displacement allowed, is to remove some of the weights now in the vessel, and to substitute lighter ones.

In the opinion of the Board the ordnance weights are the only ones which can be changed to advantage, and, after a full consideration of the whole matter, the following recommendations are made:

Remove the forward barbette, with its backing and framing complete, with the 16-inch gun and its mount, and the mechanism therefor, and twenty-five rounds of ammunition belonging to it.

Remove the after barbette, with its backing and framing, the 12-inch gun therein, with its mount, mechanism, and forty rounds of ammunition.

Remove two armored towers, for 4-inch rapid-fire guns, and six 4-inch rapid-fire guns, with their mounts and ammunition.

Remove the 15-inch dynamite gun complete with its ammunition.

Reduce the thickness of the side armor from 16-inch to 13-inch.

These weights to be replaced as follows:

Forward, one barbette 14 inches thick, carrying two 12-inch guns with their mounts and mechanism complete, and thirty rounds of ammunition per gun. The guns to be mounted on turntables, with the proper framing and supporting, and inclined shields 8 inches thick, similar to those carried on the Monitor *Puritan*.

Aft, one barbette 11½ inches thick, carrying two 10-inch guns, with their mounts and mechanism complete, with forty rounds of ammunition for each gun. The guns being protected by inclined shields 7½ inches thick, and supported by turntables and framing similar in type to those now carried by the *Puritan*.

It is estimated that this battery will bring the vessel down in the water to the same draft that she would have had with the present battery, and as the Board is of the opinion that the armored deck is now somewhat too weak it is proposed to add 1 inch in thickness to this deck forward of the forward barbette and one-half inch to that part of the deck which is under superstructure, thus making the whole of the armored deck from the bow to the after part of the after barbette 3 inches thick, the part from the after barbette to the stern remaining 2 inches thick, as at present. This addition of weight will bring the vessel down in the water about 3 inches, but in view of the military advantages of the strengthened deck the Board recommend the change.

The reason why the Board suggests that 12-inch guns be placed forward and 10-inch guns aft, instead of making the battery uniform in caliber, is that the removal of the dynamite gun from the forward part of the ship has greatly reduced the weight forward, and unless the forward guns are made heavy, as compared with the after ones, the disposition of the other weights of the ship must be changed very materially in order to restore her trim; therefore it was thought best to submit to what disadvantage there may be in the difference of the caliber between the guns in the forward and after barbettes, rather than to proceed to a very serious alteration of the plans of the vessel after she has been contracted for.

It will be observed that, in this rearrangement, the auxiliary battery of six 4-inch rapid-fire guns, with their mounts and ammunition formerly carried by the vessel, has been omitted. The weight of these guns and their ammunition was required for use in properly protecting the main battery herein recommended.

It would be practicable to replace this battery, or most of it, by reducing the caliber of the guns in the forward barbette, but, as before remarked, the Board has considered that a vessel for harbor defense will be required to meet powerful armored ships at close quarters, in which position the weight of the main battery will chiefly tell, and the rapid-fire guns, which could not be adequately protected on the displacement allowed, would be of secondary importance; therefore it was concluded to dispense with them altogether and to keep the main battery as powerful and as well protected as the weights at the disposal of the Board would admit of.

This report was approved by the Department, and two complete sets of trace plans were made by the Bureau embodying the recommendations of the Board.

ARMORED CRUISER NO. 2.

This ship was authorized by the naval appropriation act approved September 7, 1888, which provided, under the head "Increase of the Navy," for "one armored cruiser of about seven thousand five hundred tons displacement, to cost, exclusive of armament, not more than three million five hundred thousand dollars."

Under date of April 8, 1890, bids were advertised for, and a circular to bidders issued defining the chief characteristics of the vessel.

Bids were opened June 10, 1890, and the contract for the vessel awarded to the Wm. Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa.

The contract provides for the completion of the vessel by January 1, 1893.

Below are given the principal dimensions, etc., of armored cruiser No. 2:

Length on water-line	380 feet 6¼ inches.
Breadth, molded	64 feet.
Draft, mean	23 feet 3¼ inches.
Displacement corresponding	8,150 tons.
Maximum speed	20 knots.
Sustained sea speed	18.5 knots.
Complement (officers and men)	475
Endurance on total coal capacity (estimated)	13,000 miles.

The vessel has four complete decks, including the protective deck, and a large flying deck or bridge, upon which are carried the boats.

She has no sail power, but carries two military masts fitted with double fighting tops. Her freeboard to upper deck is about 20 feet, and this, together with her size, will enable her to fight her guns and maintain her speed in a sea which would render smaller ships practically helpless.

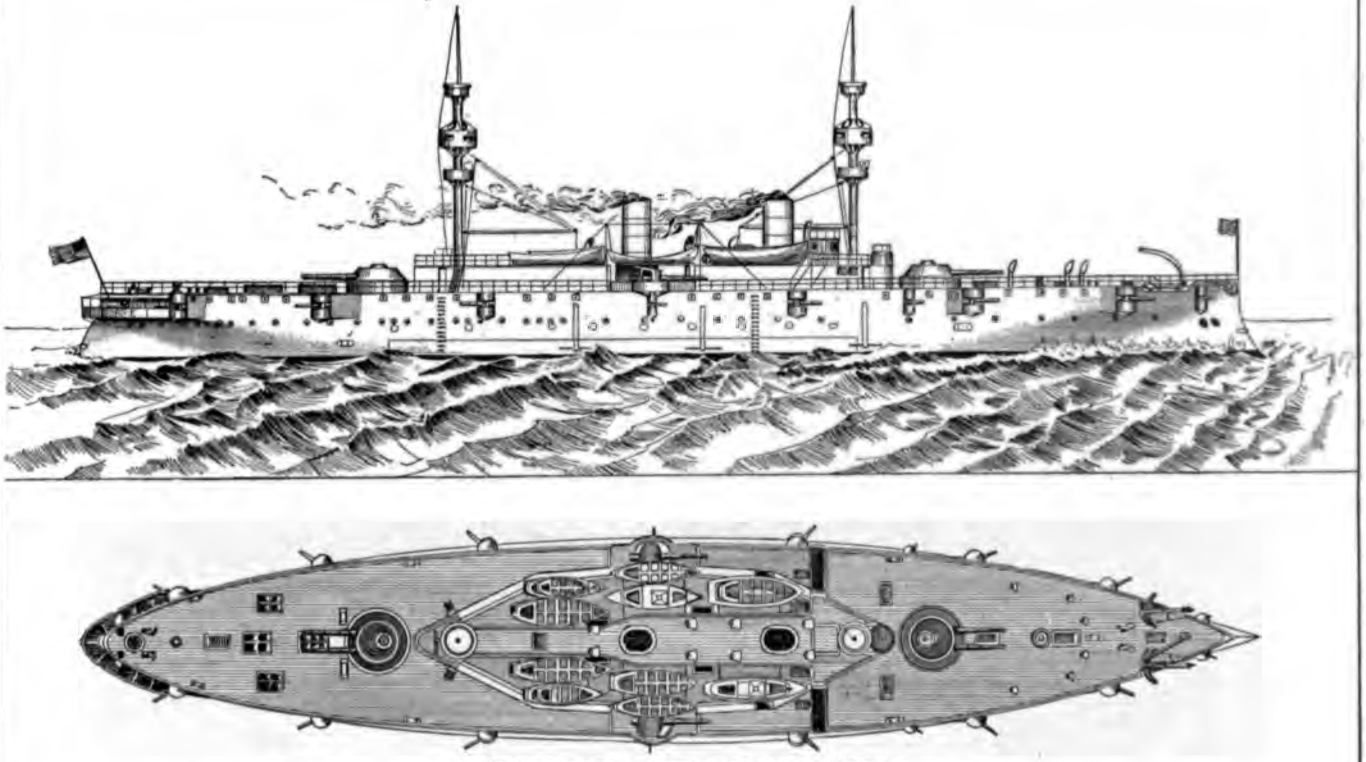
Scantlings and general construction.—The vertical keel is 20 pounds per square foot, with lower angles 4½ by 3 inches of 13 pounds per foot, and upper angles 4 by 3 inches of 10 pounds per foot.

The outer flat keel plates are 25 pounds per square foot, and the inner 23 pounds per foot.

The stem, stern post, and shaft struts are to be made of cast-steel, and the rudder frame a combination of forged and cast steel.

The transverse frames are spaced 4 feet apart within the machinery space and 3½ feet forward and aft of this space.

Within the double bottom the ordinary frames have a continuous frame angle 6 by 3½ inches of 12 pounds, continued through the margin plate, and intercostal reverse bars 4½ by 3 inches of 10½ pounds. Con-



U.S. ARMORED STEEL CRUISER No. 2

NAVY DEPARTMENT, JUNE 1890

BUREAU OF CONSTRUCTION & REPAIR.

necting bracket plates are 15 pounds next the vertical keel and 12½ pounds elsewhere.

Water-tight frames have 12½ pound intercostal plates and staple angles 3 by 3 inches of 8 pounds.

From margin plate to protective deck the frame angle of 6 by 3½ inches of 12 pounds has a reverse angle of 5 by 3 inches of 10 pounds worked on it with 17½-pound gussets at head and heel.

Forward and aft of double bottom or machinery space, and below protective deck, the frames consist of continuous Z-bars, 6 by 3½ by 3½ inches of 15 pounds per foot, with lower ends split for the admission of a 10-pound floor plate.

Above the protective deck the frames generally consist of Z-bars 6 by 3½ by 3½ inches of 15 pounds, continuous from protective deck to upper deck, with 15-pound gusset plates and 3½ by 3 inches of 9-pound angles at their heels.

Intermediate frames of the same scantlings as the above are worked between the protective and berth decks behind the side armor. There are three longitudinals on each side within the double bottom, composed of 17½ pound continuous plates slotted over the frame angles, with intercostal outer angles and continuous inner angles, both 3 by 3 inches of 7 pounds.

Beams.—To upper deck, T-bulb 10 by 5⅜ of 31½ pounds. To gun deck, angle bulb 10 by 3½ inches of 26½ pounds. To berth deck, angle bulb 10 by 3½ inches of 26 pounds. To protective deck, angle bulb 10 by 3½ inches of 26.5 pounds. To platforms, angle or Z-bars 10 or 11 pounds, respectively.

The scantling of the deck beams given above are suitably reduced toward the extremities of the vessel.

The outer plating amidships is 23 pounds per square foot from keel plate to sheer strake, which is 46 pounds. Towards the extremities the outer plating is 20 pounds and the sheer strake 30 pounds. The plating is doubled between the protective and berth decks in wake of the thin armor, and doubling plates are worked in wake of gunports where exposed to chafe of the anchors, etc. The flat keelson plate is 15 pounds per square foot. The remainder of the inner bottom is generally 12½ pounds per foot. The margin plate is 18 pounds, and the three strakes on each side directly above the longitudinals are 14 pounds.

The main transverse and longitudinal bulkheads below the protective deck have plating 15 pounds per square foot for the lower strake, 12½ pounds for the next two strakes, and 10 pounds for the remainder. The minor bulkheads below the protective deck and between the protective and berth deck have generally 10 and 8 pound plating, and the bulkheads, casings, etc., above the berth deck are 7½ pounds.

The upper deck has 22½-pound stringer plating and a complete steel flat of 10 pounds. The gun-deck stringers are 17½ pounds, and ties 15 pounds. This deck is completely plated towards the extremities with 10 pound plating.

The berth deck has 15-pound stringers, and a complete steel flat of 7½ pounds.

The yellow-pine wood flats have the following thicknesses: Upper and gun decks 3 inches, berth deck 2¾ inches.

Hull protection.—The buoyancy and stability of the ship are protected by: (1) A complete protective deck. (2) A partial belt of armor. (3) A complete belt of water excluding material.

The protective deck at the sides is 4 feet 9 inches below the water amidships and 1 foot above the water when the vessel is at the mean draught of 23 feet 3½ inches.

It is completely covered with two courses of plating having a thickness of 3 inches amidships and 2½ inches forward and aft. The slopes amidships are covered with an additional thickness of 3 inches, making their total thickness 6 inches.

In wake of the machinery spaces a belt of thin armor is worked between the protective and berth decks. The total thickness of metal on the side throughout this space is 5 inches.

A coffer-dam 3 feet 6 inches deep is worked between the protective and berth decks, and extends completely around the ship. It is filled with an approved water-excluding material.

A large proportion of the coal supply is stowed on the armor deck, forming an additional safeguard against the effects of damage near the water-line.

Battery and its protection.—The ship carries six 8-inch B. L. R., twelve 4-inch R. F. G., eight 6-pounder R. F. G., four 1-pounder R. F. G., four Gatling guns, and six torpedo-tubes.

Of the 8-inch guns, two are mounted in a barbette forward on the upper deck, and two in a similar barbette aft, while the remaining two are carried in broadside amidships on the upper deck.

The barbettes are 10 inches thick, and the revolving conical shields on the guns 7 inches. The sloping armor between the upper and gun decks beneath the barbettes is 5 inches thick and the ammunition tubes below are also 5 inches.

The 8-inch guns on the broadside are protected by partial barbettes 2 inches thick and shields on the guns.

The 4-inch R. F. G. are mounted on the gun deck in armored sponsons 4 inches thick and have shields on the guns closely covering the ports. Their protection is further assured by 1-inch splinter bulkheads.

The 6-pounder guns are protected by 2-inch armor or its equivalent.

There is one fixed torpedo-tube in the bow, one fixed in the stern, and two training on each broadside—all above water.

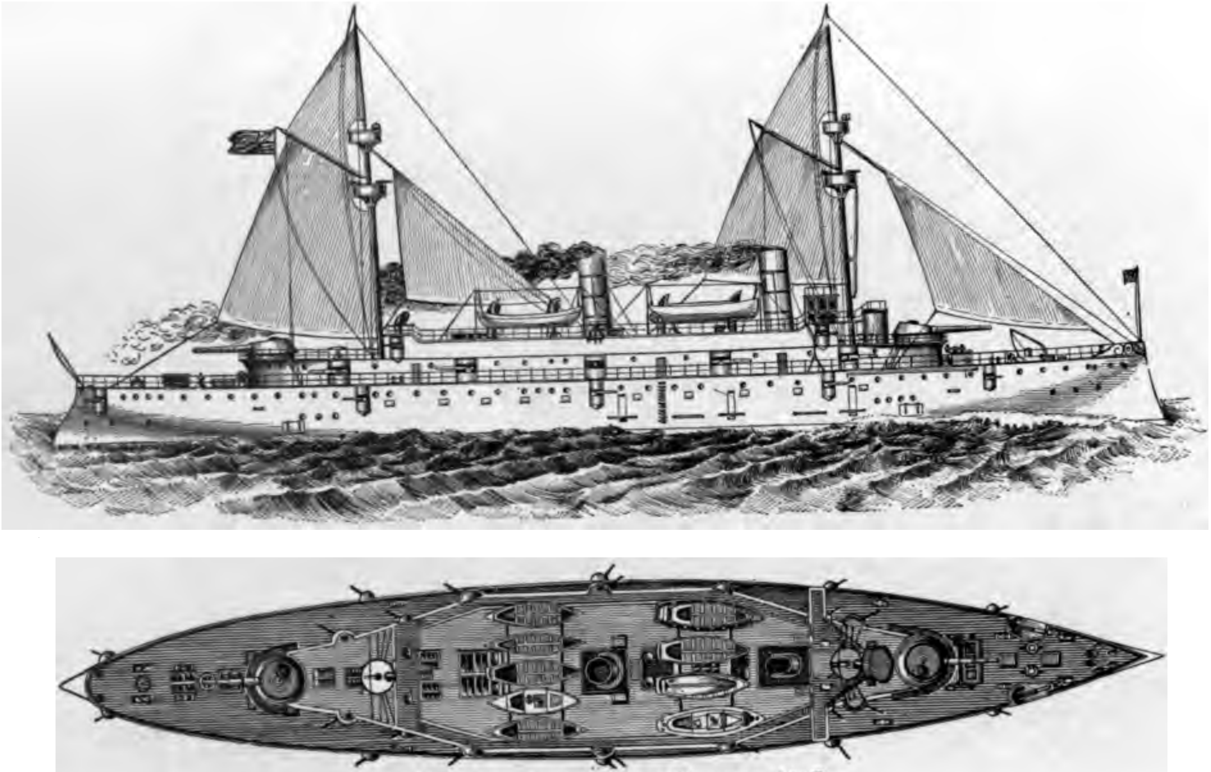
The 8-inch guns are 25 feet and the 4-inch guns 16½ feet above the water.

Machinery.—The vessel has twin screws, driven by four vertical, inverted, direct-acting, triple-expansion, three-cylinder engines, arranged in four water-tight compartments. The cylinder diameters of each engine are 32, 46, and 70 inches, respectively, and the stroke 42 inches. The air and circulating pumps are driven independently. There are four main condensers of composition and sheet brass, each having about 5,560 square feet of cooling surface, and two auxiliary condensers. It is estimated that the total collective I. H. P. of propelling, air-pump, and circulating-pump engines should be 16,000 when the propelling engines are making 129 revolutions per minute.

There are six double-ended, eight-furnace, horizontal-return, fire-tube main boilers, arranged two abreast in three water-tight compartments, with six thwartship fire-rooms. They are about 15 feet 3 inches external diameter and 21 feet 3 inches long. Their working pressure is 160 pounds, their total grate surface is about 930 square feet, and total heating surface about 31,190 square feet.

There are two auxiliary single-ended two-furnace boilers placed above the protective deck. They have a total grate surface of about 64 square feet and heating surface of about 1,937 square feet.

All the boilers are fitted to be worked under forced draught on the air-tight fire-room system.



U. S. PROTECTED STEEL CRUISER No 6
BUREAU OF CONSTRUCTION AND REPAIR
NAVY DEPARTMENT MARCH 1890.

The arrangement of the engines is such as to show great economy at low speeds, and it is estimated that on the total bunker capacity of 1,500 tons of coal the vessel will have an endurance of about 13,000 miles at a speed of 10 knots.

Miscellaneous.—The vessel has a complete electric-lighting outfit, arranged in accordance with the most recent practice in the service.

There are fittings for artificial ventilation throughout, and the living quarters have excellent natural ventilation as well.

Great care has been taken to make the pumping and drainage arrangements thorough and efficient.

The vessel is fitted as a flag-ship in addition to the quarters of admiral and captain, and there are state-rooms for twenty ward-room officers, twelve junior officers, and two warrant officers.

The usual officers' store-rooms, etc., are provided, and the quarters for the crew are roomy and comfortable—in fact, the size and type of the vessel are such as to make the accommodations throughout unsurpassed for spaciousness and comfort.

PROTECTED CRUISER NO. 6.

This ship was authorized by the naval appropriation act approved September 7, 1888, which provided, under the head "Increase of the Navy," for "one steel cruiser of about 5,300 tons displacement, to cost, exclusive of armament, and excluding any premium that may be paid for increased speed, not more than $1,800,000."

Under date of April 8, 1890, bids were advertised for, and a circular issued to builders defining the chief characteristics of the vessel.

Bids were opened June 10, 1890, and the contract for the vessel awarded to the Union Iron Works, San Francisco, Cal.

The contract provides for the completion of the vessel by April 1, 1893.

This vessel is of a well-known type, but exceeds in size any of her predecessors in our service and the majority of such foreign vessels.

In view of the rapid and increasing development of quick-firing guns and high explosives, and of the acknowledged necessity for a sustained speed which shall more nearly approach the measured-mile speed than has been hitherto customary, the Bureau has utilized the increased displacement of this vessel to introduce features of protection hitherto unattained by this type, and to allow a weight of machinery sufficient to insure a reasonable maintenance of high speed.

The following are the principal dimensions, etc., of cruiser No. 6:

Length on water line	feet	340
Breadth molded	do	53
Normal mean draught	do	21½
Displacement corresponding	tons	5,500
I. H. P. on trial (estimated)		13,500
Guaranteed speed on trial	knots	20
Sustained sea speed	do	19
Maximum coal capacity	tons	1,300
Endurance at 10 knots	miles	13,000
Complement		466

The vessel has three complete decks, including the protective deck, and a large superstructure amidships, which is cut away forward and aft, and ends at the 8-inch gun barbettes.

She has two masts, with a fighting top and electric-light top on each, and carries sufficient fore and aft sail to steady her in a sea-way. Her freeboard is forward 18 feet, and 17 feet aft.

Scantlings and general construction.—The vertical keel is 18 pounds per square foot, with outer angles 4 by 3 inches by 12 pounds per foot, and inner angles 3½ by 3 inches by 10 pounds per foot.

The outer flat keel plates are 22½ pounds per square foot, and the inner 20 pounds.

The stem, stern post, and shaft struts are to be of cast-steel, and the rudder frame a combination of forged and cast steel.

The transverse frames are spaced 4 feet apart within the machinery space, and 3½ feet apart elsewhere.

Within the double bottom the ordinary frames are formed by a frame angle 4½ by 3 inches of 11 pounds per foot, continuous from keel to margin plate, with intercostal reverse bars 4 by 3 inches of 10 pounds, and bracket plates of 12½ pounds per square foot next the vertical keel, and 10 pounds elsewhere.

Water-tight frames have intercostal plates of 10 pounds with staple angles 3 by 3 inches of 7 pounds.

From margin plate to protective deck the frames consist of Z-bars 6 by 3½ by 3½ inches of 15 pounds, with 15-pound gussets at head and heel.

Forward and aft of double bottom or machinery space, and below the protective deck, the frames consist of Z-bars 6 by 3½ by 3½ inches of 15 pounds split below the turn of the bilge for the admission of a 10-pound floor-plate.

Above the protective deck the frames generally consist of Z-bars 6 by 3½ by 3½ inches of 15 pounds, continuous from protective deck to main deck, and connected to the protective deck by 15-pound gusset plates and 3½ by 3 inches of 9-pound angles.

The superstructure is framed up with 6 by 3½ by 3½ inches of 15-pound Z-bars, with a 10-pound plate welded in at the split heel and connected to the main-deck plating by a 3 by 3 inches of 7-pound angle.

There are three longitudinals on each side within the double bottom, composed of 14-pound continuous plates, slotted over the frame angles with the intercostal outer angles and continuous inner angles both 3 by 3 inches of 7 pounds.

Beams.—Superstructure deck, angle bulb, 7 by 3 inches of 18½ pounds; main deck, tee-bulb, 9 by 5 inches of 27 pounds; berth deck, tee-bulb, 9 by 5 inehs of 27 pounds; protective deck, angle bulb, 10 by 3½ inches of 26½ pounds; platforms, angle or Z-bars, angle-bars not exceeding 10 pounds per foot, and Z-bars not exceeding 11 pounds.

The deck beam scantlings given above are suitably reduced towards the extremities of the vessel.

The outer plating amid-ships is 20 pounds per square foot from flat keel to sheer strake, which is 40 pounds per foot. Toward the extremities the outer plating is reduced to 17½ pounds and the sheer strakes to 30 pounds. The plating is doubled in wake of gun-ports, anchor chafe, etc.

The flat keelson plate is 15 pounds per square foot. The remainder of the inner bottom is 12½ pounds per square foot, and the margin strake 15 pounds.

The main transverse and longitudinal bulkheads below the protective deck have, generally, their lower strakes of 12½-pound plating, and the remainder of 10-pound plating. Minor bulkheads below and those between the protective and berth decks are of 10 and 8 pound plating.

The superstructure deck has 12½-pound stringers, with 10-pound tie plates and 8-pound plating around hatches, etc.

The main deck has a complete steel flat, 20-pound stringers, and the remaider of 10 pounds.

The berth deck has 15-pound stringers, and 10-pound plating forward and aft, while between the stringers and hatch casings is worked 7½-pound plating.

The yellow pine wood flats have the following thicknesses: Superstructure deck 2¾ inches, main deck 3 inches, berth deck 2½ inches.

Hull protection.—A complete protective deck is worked 2 inches thick on the flat throughout, 4¾ inches on the slopes amid-ships, and 3 inches on the slope forward and aft.

A water-excluding belt 2 feet 9 inches thick is worked above the protective deck, completely surrounding the ship. It extends to a height of 4 feet above the water-line. The space immediately above the protective deck is closely subdivided, and much of it is covered with coal, forming an additional safeguard against the effects of damage near the water-line.

Battery and its protection.—The ship carries four 8-inch B. L. R., ten 5-inch R. F. G., fourteen 6-pounder R. F. G., six 1-pounder R. F. G., four gatlings and six torpedo tubes.

The 8-inch guns are mounted on the main deck forward and aft in the center line, in elevated barbettes 4 inches thick, with equivalent conical turrets around the guns. The latter are about 10 feet above the deck, and have very great train. The armored ammunition tube is partly conical and partly straight, being 3 inches thick throughout.

The 5-inch guns are mounted in the superstructures in such a way that four of them can fire right ahead, and five on either beam, and four right astern.

They are each protected by a 4-inch segmental shield.

The 6-pounder guns have 2-inch segmental protection.

There is one fixed torpedo tube in the bow, one fixed tube in the stern, and two training tubes on each broadside.

The 8-inch guns are 26 and the 5-inch guns 18 feet above the water.

Machinery.—The vessel has twin-screws, driven by two vertical, inverted, direct acting, triple expansion, three-cylinder engines, arranged abreast each other in two water-tight compartments. The cylinder diameters of each engine are 42, 59, and 92 inches, respectively, with a stroke of 42 inches. The air and circulating pumps are driven independently. There are two main condensers of composition and sheet brass, each having about 9,450 square feet of cooling surface and two auxiliary condensers.

It is estimated that the total collective I. H. P. of propelling, air-pump, and circulating pump engines should be 13,500 when the propelling engines are making 129 revolutions per minute.

There are four double-ended and two single-ended horizontal-return fire-tube boilers placed in the center line in four water-tight compartments. The double-ended boilers have eight furnaces each, and the single-ended four furnaces each. They are all about 15 feet 3 inches in outside diameter, the double-ended about 21 feet 3 inches long, and the single-ended 10 feet 11½ inches long.

The working pressure is 160 pounds, the total grate surface 824 square feet, and total heating surface 28,300 square feet.

All the boilers are fitted to be worked under forced draught on the air-tight fire-room system.

It is estimated that on the total bunker capacity of 1,300 tons of coal, the vessel will have an endurance of 13,000 miles at a speed of 10 knots.

Miscellaneous.—The vessel has a complete electric-lighting plant of the most modern type, and great care has been taken to make the fittings in connection with pumping, drainage, and ventilation complete and efficient.

The vessel is fitted as a flag-ship, and in addition to the quarters for admiral and captain, there are state-rooms for sixteen wardroom officers, berths for twelve junior officers, and rooms for two warrant officers.

The usual offices, store-rooms, etc., are provided, and there is ample accommodation for the crew.

HARBOR-DEFENSE RAM.

Plans have been completed for a twin-screw, armor-plated, harbor-defense ram, upon the design of Rear-Admiral Ammen, U. S. Navy, authorized by act of Congress March 2, 1889.

The principal features are:

Length over all	feet..	243
Length on load water-line	do...	242¾
Breadth, extreme	do...	43 5/12
Breadth at water-line	do...	41 11/12
Draught amidships	do...	15
Displacement	tons..	2,050
Indicated horse-power		4,800
Speed	knots..	17

The vessel is designed upon the longitudinal and bracket system, with an inner bottom extending from the collision bulkhead to the stern.

The longitudinals and girders supporting the deck are to be continuous, converging to the stem casting and to the stern, the frames and beams to be intercostal. The depth of longitudinals and vertical keel throughout their length to be 24 inches; the girders supporting the armored deck to be 15 inches. The vertical keel, two longitudinals, and armor shelf on each side of the vertical keel are to be water-tight, forming, transversely, 6 compartments, these being divided longitudinally by water-tight frames. By this means the space between the inner and outer skin is subdivided into 72 compartments.

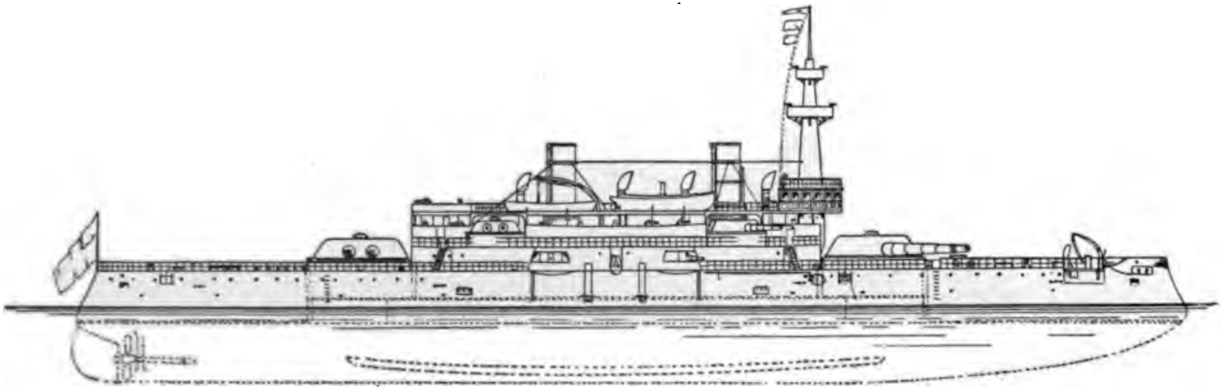
The transverse and longitudinal bulkheads between inner skin and deck armor divide this space into 30 compartments, making a total of 102 compartments in the vessel.

The vessel is to be provided with a removable wrought steel ram-head, to be accurately fitted and securely held in position in the cast-steel stem.

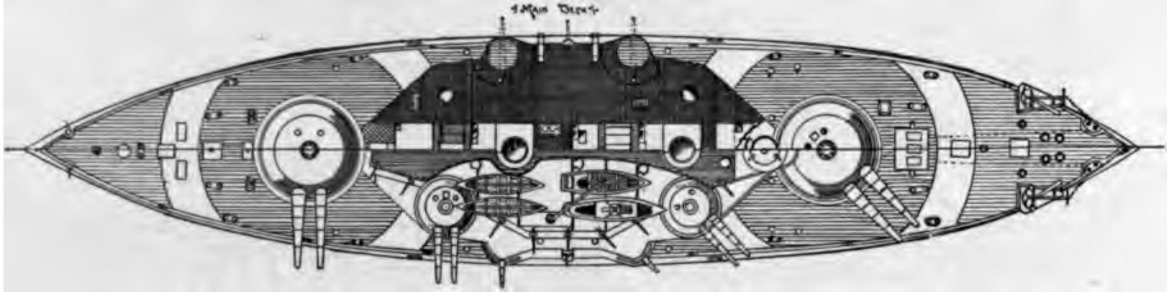
Scantling.—The inner keel to be 17½ pounds; the out keel 20 pounds per square foot; the vertical keel 17½ pounds, with two 3½ by 3 inches of 8 pounds per foot angles at the top, and two angles 4 by 3 inches of 9 pounds per foot at the bottom, connecting it with the flat keel plates.

The flat keelson plates will be 15 pounds per square foot, the outside plating 15 pounds, and the inner plating 10 pounds per square foot, respectively. The plates of the longitudinals are to be 15 pounds per square foot for the water-tight spaces and 12½ pounds per square foot for the remainder. Angles at top and bottom of these longitudinals to be 3 by 3 inches of 7 pounds per foot.

The main frame angles to be 3½ by 3 inches of 8 pounds per foot, reverse angles to be 3 by 3 inches of 7 pounds per foot. Angles to water-tight frames to be 3 by 3 inches of 7 pounds per foot. Floor plates to water-tight frames to be 10 pounds per square foot; all others to be 12½ pounds.



COAST-LINE BATTLE SHIPS NOS. 1, 2, & 3



Main Deck [illegible]

The bulkhead plates of 10 pounds per square foot are to be stiffened by angles 3 by 2½ inches of 6 pounds per foot.

Armor.—The outside strake of the deck armor is to be 6 inches in thickness, the next strake inboard to taper in thickness in its breadth from 5½ inches to 2½ inches, the remainder of the deck plating to be 2½ inches in thickness, including the lower course of plating.

The side armor to be two strakes in depth, the upper 6 inches in thickness, and the lower three inches, to be secured by bolts with counter-sunk heads driven from the outside through wood backing of yellow pine, and two backing plates, each 20 pounds per square foot, and set up with nuts on rubber washers.

All hatches through the armored deck to have battle plates, and the smoke-pipe and ventilators to have inclined armor 6 inches in thickness. The conning tower to be 18 inches in thickness.

Quarters for officers and crew.—The wardroom is on the after berth deck just abaft the engine-room bulkhead, into which open seven staterooms and a pantry; abaft the officers' quarters is a berthing space for a portion of the crew, the forward berth deck being designed entirely for the crew.

Machinery.—The engines are triple expansion and of the horizontal type, each engine being in a separate compartment. There are four cylindrical horizontal fire-tube boilers placed in two water-tight compartments.

The engines are to develop 4,800 horse-power under forced draught, with a corresponding speed of 17 knots.

Lighting, drainage, and ventilation.—There will be a complete installation of electric lights sufficient for lighting all parts of the vessel, and arranged in duplicate so as to guard against accident.

The drainage system to be so arranged that any compartment can be pumped out by the steam-pumps.

The vessel is to be submerged to fighting trim by means of fourteen 8-inch Kingston valves, one in each transverse water-tight compartment of the double-bottom, and sluice-valves will be fitted in the vertical keel and the water-tight longitudinals in these compartments.

The foul air to be exhausted from all parts of the vessel by means of blowers in engine and fire-rooms; the fresh air to be supplied from main ventilator through air-ducts led along the under side of deck forward and aft.

The only projections above the armor deck are the conning tower, smoke-pipe ventilators, hatch coamings, and skid beams upon which the boats are supported.

The vessel has no armament and is to rely entirely upon ramming for her offensive power. Advertisements for proposals have been issued, bids to be opened December 20, 1890.

ARMORED COAST-LINE BATTLE-SHIPS.

Bids were opened for these vessels October 1, 1890. The Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, offered to build two vessels 12 feet longer than the ones proposed by the Department, the additional displacement to be utilized at the discretion of the Department. Their bid was accepted, and the third vessel was awarded to the Union Iron Works, of San Francisco, on similar modified plans. All the changes due to an offer to build a larger vessel within the appropriation were made in the Bureau of Construction.

These vessels were designed with a view of meeting in battle vessels carrying the heaviest guns and armor, after a careful study of the vessels of other powers, and the conditions defined by our coast-line, and our position as a nation.

The vessel is of great fighting power united with adequate protection, able to take the sea in all weathers, and with draught suited to work in our shallow harbors.

The hull is protected by belts of heavy armor 7½ feet wide turned in forward and aft to sweep around the bases of the armored redoubts, the whole including about 75 per cent. of the water-plane area. Forward and abaft this belt are heavy under-water protective decks, sloping at the sides to 4½ feet below the water. There is also an armored deck over the belt. Coal bunkers are worked over the belt deck, and belts of water-excluding material are worked on the slopes of the armor deck forward and aft. Above the belt armor and extending from redoubt to redoubt, the side is protected by 5 inches of steel.

The vessel is cut up forward, making a powerful ram bow, and doing away with excessive bow waves on account of the easier lines so obtained as well as greatly adding to the maneuvering power.

Length on the water-line	feet	348
Breadth, extreme	do	69¼
Draught forward and aft	do	24
Displacement	tons	10,200
Maximum speed	knots	16.2
Sustained sea-speed	do	15
Tons per inch		42

Scantling and general construction.—The vertical keel is 20 pounds, with 4 by 4 inches of 13-pound angles on the lower edge and 3 by 3½ inches of 8-pound angles on the upper edge. The flat keel plates are: outer, 30 pounds; inner, 25 pounds. The stem, stern-posts, struts, and rudder-frame will be made of cast steel or the best hammered scrap-iron.

The transverse frames are spaced 4 feet apart in the double bottom and 3½ feet at the ends. From armor shelf to keel the frame angles are 5 by 3½ inches of 12 pounds per foot, the reverse angles 4½ by 3 inches of 10 pounds per foot, with bracket plates of 15 and 13 pounds and lightened plates of 12½ pounds. The outer angle is continuous, the reverse frame angle being in short lengths between the longitudinals. The water-tight floors are of 12½ pounds, with 3½ by 3 inches of 8-pound box angles.

Before and aft the double bottom, and below the protective deck, the frames are made of channel or Z bars 6 by 3½ by 3½ inches, of 15 pounds per foot, with 12-pound bracket plates. Above the side armor and the protective deck at the ends the frames are of 6 by 3½ by 3½ inches of 15 pounds, with alternate frames of the same size in wake of the casemate armor.

The longitudinals are generally of 17½-pound plates, with 8-pound angles on the outer edges and 7-pound angles on the inner edges; the third longitudinal, which is water-tight, however, is of 20 pounds, and the shelf plate of 25 pounds.

The main-deck beams are of 10 by 3½ inch angle bulbs of 27 pound per foot; the berth-deck beams of 9 by 3½ inches, of 22-pound angle bulbs, increased to 24 pounds where coming under armor; the protective-deck beams are 9 by 3½ inches, of 24 pounds per foot; the platform beams are of 10-pound angles or 11-pound channel bars; the superstructure-deck beams are 9 by 4 inches, of 23½-pound -bulbs; the bridge beams are 9 by 3½ inch of 21.8 pound angle bulbs.

The bottom plating for a length of 230 feet amid ships is 25 pounds per square foot up to the water-line; forward and abaft these limits it is 23 pounds. Above the water-line it is 18½ pounds throughout, thickened wherever necessary on account of the chafe of the anchors, blast of guns, etc. The flat keelson plate is 15 pounds, the inner bottom as far as third longitudinal 14 pounds per square foot, thence to armor shelf 10 and 7½ pounds per square foot.

There is a middle-line bulkhead of 12 and 10 pounds per foot, well stiffened horizontally and vertically, between the two engine-rooms and the fire-room on each side. The vessel is divided into a great number of water-tight compartments by means of longitudinal and transverse bulkheads of 10 and 12 pound plates.

The decks are all plated over with plates not less than 12½ pounds to the foot, and the main and superstructure decks are covered with 3-inch deck planks.

Armor.—There is a water-line belt 3 feet above and 4½ feet below the water-line of 18-inch armor. Rising from this at each end are armored redoubts of 17 inches in thickness extending above the main deck 3½ feet, giving an armored freeboard of 15 feet 2 inches. These redoubts protect the turning gear of the turrets and all the operations of loading. The turrets are inclined, 17 inches thick, powerfully strengthened. The horizontal thickness of the turrets is 20 inches. The side armor-belt is backed by 6 inches of wood, two ¾-inch plates, and a 10-foot belt of coal. The vessel above the belt has 5 inches of armor protection.

The 8-inch guns have barbettes of 10 inches, inclined turrets of 8½ inches, and cone bases and loading tubes of 3 inches.

The 6-inch guns are protected by 5 inches of armor and have 2-inch splinter bulkheads worked around the deck, inside of which the ammunition for these guns is set up.

The 6-pounders, where mounted between decks, have 2-inch armor worked around them; elsewhere they have the usual service shields. The 1-pounders are protected by 2 inches of steel.

The deck over the belt is 2¾ inches, and at the ends the under-water decks are 3 inches. These decks are made up of two thicknesses of ½-inch mild steel plates, with the remaining thickness all in one plate of steel armor.

There is a 10-inch armored conning tower, with a 7-inch tube for protecting the voice pipes, electric wires, and steering connections.

Armament.—Four 13-inch 35 caliber breech-loading rifles; eight 8-inch breech-loading rifles; four 6-inch breech-loading rifles; twenty 6-pounder rapid-fire guns; six 1-pounder rapid-fire guns; two Gatlings; and six torpedo tubes or guns.

This represents a weight of armament superior to that of any of the latest battle-ships laid down by foreign powers.

The 13-inch guns are 17⅔ feet above the water and have great arcs of train. The 6-inch guns are 14 feet 10 inches above the water, and all fire across the center line. The 8-inch guns are mounted 24¾ feet above the water, and can fire over the tops of 13-inch guns, having a train of 14° across the middle line. These guns can pierce at 2 miles the armor of many of the modern armored cruisers of great coal endurance. They can be brought into action early in the engagement on account of their great height, and can be used with great effect against the lighter-armored and unarmored parts of the heavier battle ships.

Special attention has been paid to the ammunition supply, and a rapid, efficient, and thoroughly protected supply has been secured, and one which it is believed is an advance upon all systems now in vogue.

The powerful secondary battery is protected in part by shields built in the vessel and in part by shields on the mounts, and is so disposed that a stream of projectiles will radiate from the vessel, which will lead to the almost certain destruction of any light boat venturing within range.

Fixed torpedo-tubes are carried at the bow and stern, and two training tubes firing through 5 inches of protection are carried on each broadside.

All modern appliances for offensive and defensive purposes, such as torpedo-defense nets, search-lights, etc., are carried, and weight is reserved for any new fittings or devices which the constant progress in the art of war will most certainly develop as the work progresses.

Great care has been taken in disposing this great battery that one gun will not interfere with the line of fire of another, the boats have been stowed amid-ships where the blasts can not reach them, and special strengthening has been given to the sides and deck, that they may withstand the effect of the great strains brought upon them by the fire of the larger guns. The 13-inch guns are kept 6 feet above the deck at the middle line.

An armored conning tower of 10-inch plates is built forward, having an armored tube to protect the communications, by means of which the commanding officer will direct the movements of the vessel, guns, and men. Rising from this conning tower is a military mast, carrying two tops for rapid-fire and machine guns, the ammunition being sent to them inside the mast.

Lighting, drainage, and ventilation.—An electric plant will be placed on board to furnish all necessary electric energy for lighting the vessel, working the search-lights, and supplying electric motors.

The drainage system is so arranged that any compartment can be pumped out by hand or steam, and the system of drainage has been much simplified. Powerful wrecking pumps are carried in the donkey-boiler rooms above the protective deck so that in case water enters the fire-rooms below steam can still be utilized in pumping out the vessel.

A thorough system of ventilation is installed, and air can be forced into or drawn out of any part of the vessel by means of steam-fans of great capacity, while special means are to be provided for such places as the donkey-boiler, dynamo, and hydraulic pumping rooms, and for removing the gases from coal-bunkers.

Machinery.—The engines are twin screw of the vertical, triple expansion, direct acting, inverted cylinder type, placed in water-tight compartments separated by bulkheads.

The diameters of the cylinders are, high-pressure 34½ inches, intermediate 48 inches, low pressure 75 inches, stroke 42 inches.

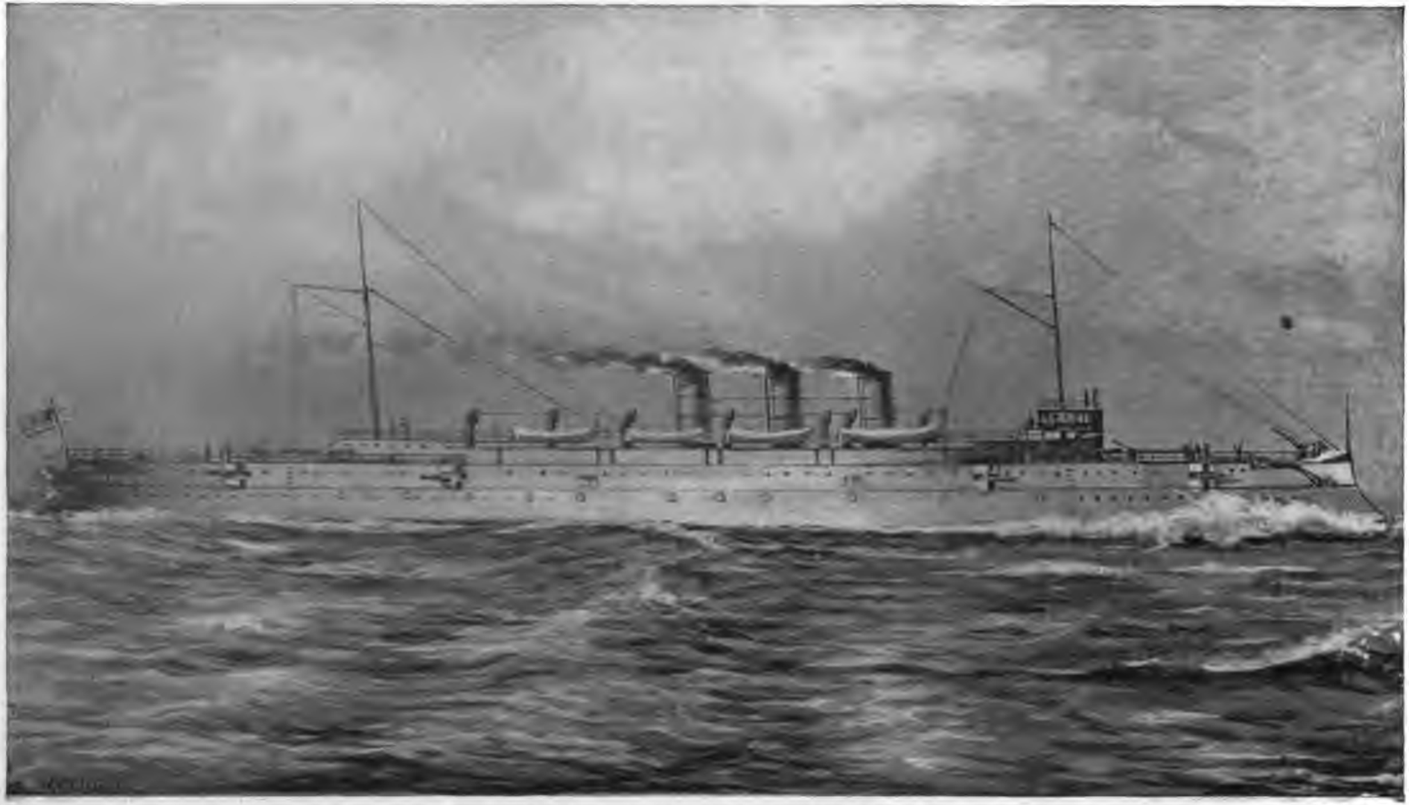
The condensers are of composition and sheet brass, each main condenser having a cooling surface of 6,353 square feet. The circulating pumps are centrifugal and independent.

There are four double-ended and two single-ended auxiliary steel boilers of the horizontal return fire-tube type.

The main boilers will be about 15 feet outside diameter and 18 feet long, and the auxiliary single ended boilers will be about 10 feet 2 inches diameter and 8½ feet long, all constructed for a working pressure of 160 pounds per square inch.

Each double-ended boiler will have eight corrugated furnace flues 3 feet internal diameter. The total heating surface of the main boilers is 17,460 square feet and grate surface 552 square feet.

The auxiliary boilers have a grate surface of 64 square feet and a heating surface 1,937 square feet.



U. S. S. Protected Cruiser No. 12.

Quarters for officers and crew.—The captain has one large cabin and two state-rooms, with adjoining bath-rooms, so that in case an admiral may wish to transfer his flag to these vessels he will have comfortable quarters.

There are 16 wardroom state-rooms on the berth deck opening into a passage which leads to the wardroom mess-room. This mess-room is lighted from above and is against the side of the vessel, with a number of air ports opening into it. Adjoining it is a large pantry furnished with all the necessary sinks and fittings, and a steam-table for keeping food warm after it is brought from the galley. The ward-room officers have a lavatory, fitted with tubs and shower baths. The junior officers have a large compartment similar to the wardroom mess-room, and the torpedo-room adjoining will be made as a country. They have a bath-room similar to that of the wardroom. On the starboard side of the berth deck just forward of the countries are the water-closets for all the officers. On the forward berth deck is a large berthing space for the crew, left open as one large room. In this room alone there are about 100 cubic feet for every man in the crew, while in other parts of the berth deck and under the superstructure a large number of men can be berthed. In the forward end of this berthing space are a number of wash-basins and shower-baths, and just forward of them separated by a water-tight bulkhead are the water-closets for the men.

Offices, store-rooms, etc.—The usual offices are fitted, and a large chart-house has been built containing a berth, wash-bowl, transoms, tables, etc., in addition to the steering wheel, telegraphs, and voice-pipes. The store-rooms are ample for stowing provisions for a crew greatly exceeding the one contemplated for three or four months.

The coal-bunkers will stow 1,800 tons of coal, sufficient to carry the vessel at 10 knots 16,000 miles.

PROTECTED CRUISER NO. 12.

In cruiser No. 12 the United States will possess a vessel having a sustained sea speed of 21 knots, the conditions in the fire-rooms not being harder than in the ordinary Atlantic liner. The vessel is well protected by a heavy armor deck running fore and aft and covering magazines, engines, boilers, and steering gear. She can carry 750 tons of coal on normal draught, and has a coal capacity of 2,000 tons.

This has been accomplished on 7,400 tons displacement, with normal coal supply. and we have here a vessel which can overhaul and sink any merchant vessel now afloat.

Length on load line	feet..	400
Beam, molded	do...	58
Draught, mean, normal	do...	23
Displacement	tons..	7,400
Sustained sea speed	knots..	21
Maximum speed	do...	22
Indicated horse-power (sustained)		20,000
Indicated horse-power (maximum)		23,000

Displacement per inch 34-$\frac{8}{10}$-tons; with bunkers full of coal extra draught = 3 feet.

Scantling and general construction.—The outer flat keel is 25 pounds, the inner 22½ pounds. The vertical keel is 20 pounds per square foot. The stem and stern-post are of cast steel.

The transverse frames within the double bottom have the main bars 5 by 3½ inches of 12 pounds per foot, and reverse bars 5 by 3 inches of 10 pounds, with bracket plates of 12½ and 10 pound plates. Between the double bottom and the protective deck the frames are Z-bars 6 by 3½ by 3½ inches of 15 pounds per foot, with 15-pound brackets at the top and bottom. Elsewhere the frames are also Z-bars 6 by 3½ by 3½ inches of 15 pounds per foot.

The longitudinals are 16 pounds per foot with 3 by 3 inches of 7 pounds per foot, top and bottom angles.

The outer bottom plating is generally 22½ pounds; inner bottom 12½ pounds.

The upper-deck beams are 10 by 5⅝ inches, of 31½ pounds per foot T-bulbs; gun-deck beams 9 by 3½ inches, of 22 pounds angle bulbs; berth-deck beams 5 by 3 inches, of 11 pounds per foot angles; protective-deck beams 10 by 3½ inches, of 26½ pounds angle bulbs.

The fore and aft and athwart-ship bulkheads are of 7½ to 15 pound plates, well stiffened and made water-tight.

The protective deck is 4 inches thick on the slopes and 2½ inches elsewhere; the top of deck beams at side being 4 feet 6 inches below the load-line, and the beams at center generally 1 foot above, except at the ends, where it tapers down to side line of beams. The flat is worked in two thicknesses of 1¼-inch plates; on the slopes over the machinery an additional thickness of 1½ inches is worked on top of the 1¼-inch plates, making the slopes 4 inches in thickness.

The stringers of the upper deck are 72 inches wide, of 25 pounds per square foot, tapered at the ends to about 54 inches, of 20 pounds; these stringers are filled in between with 10-pound plating from end to end of vessel.

The gun-deck stringers are 78 inches wide, of plating 15 pounds per square foot, tapering to 52 inches wide at the ends.

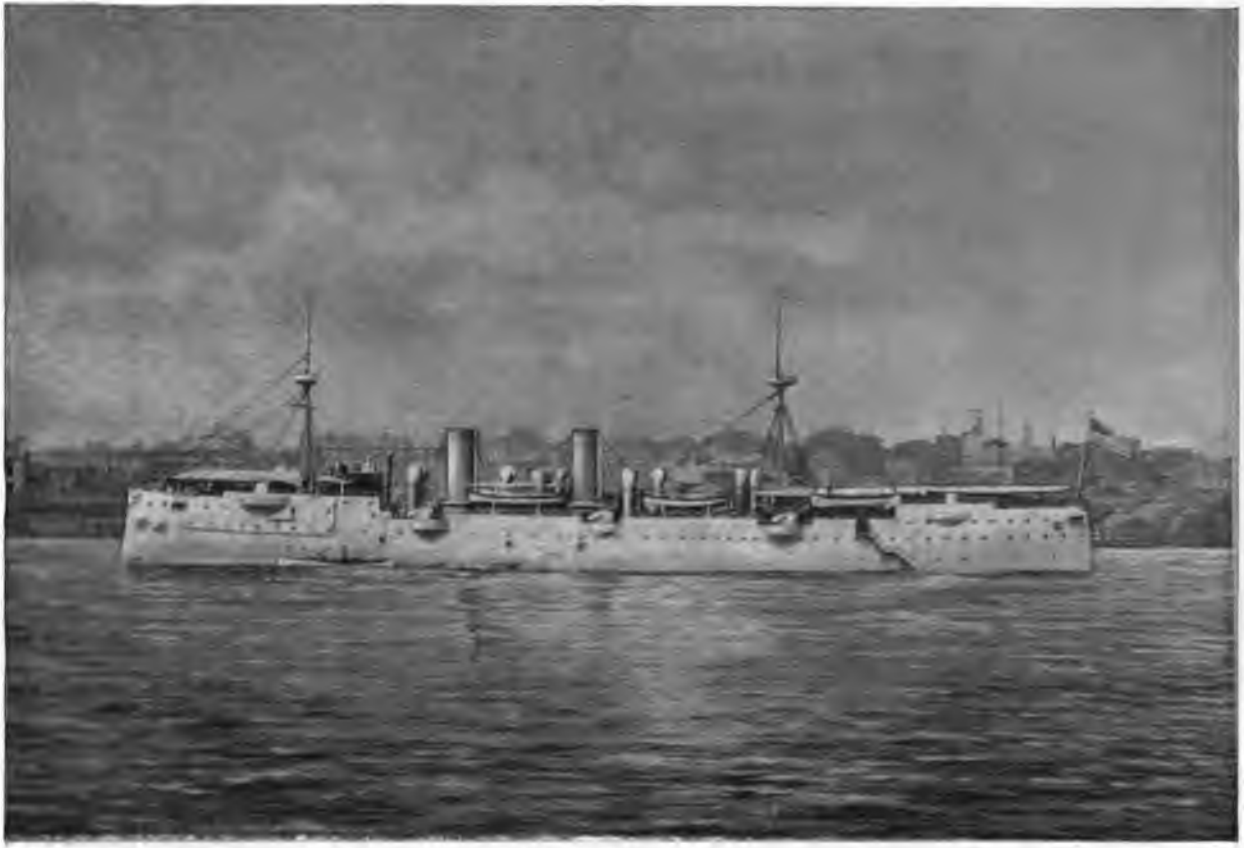
The main battery consists of four 6-inch B. L. R. of high power; eight 4-inch B. L. R. rapid firing; about eighteen machine guns, and six torpedo tubes.

The arrangement of the motive power will be somewhat novel, as the force will be transmitted through three screws; one placed amid-ships as in ordinary single-screw vessels, and two others placed farther forward, one on each side, as is usual in twin-screw vessels; this arrangement is not entirely new, having been adopted by the French for some of their later vessels, but represents the latest advance in the steam-engineering line where such great power is to be transmitted. If twin-screws were used, over 10,000 I. H. P. would pass through one shaft, now each shaft transmits only 6,850, and the vessel has one more chance in case of breakdown.

The machinery consists of three sets of triple-expansion, vertical, inverted cylinder engines, driving the triple-screws before mentioned, the center screw being about 4 feet 6 inches below the other two.

Each engine is placed in a water-tight compartment, and is complete in every respect, so that the vessel may be propelled at a slow speed by the center screw alone; by the two outer screws at a medium speed, and by the three screws when the highest rate of speed is required. Each shaft is fitted with a disengaging coupling, so that when not in use the propellers are free to revolve.

A great advantage of this arrangement is that it allows the machinery to be worked at its maximum and most economical number of revolutions at all rates of the vessel's speed; and each engine can always be used for propelling the vessel, an advantage of great importance, and one that the arrangement of two sets of engines working on the same screw does not possess.



U. S. S. BALTIMORE.

The total I. H. P. at 129 revolutions per minute and a forced draught of 1 inch of water is 21,000 horses.

There are eight main doubled-ended boilers placed in four watertight compartments, and two single-ended, auxiliary boilers placed on the berth deck. The air-tight fire-room system of forced draught is used.

All the boilers are constructed of steel for a working pressure of 160 pounds.

The vital portions of the vessel being protected by an armored deck, the space between this deck and the gun deck will be minutely subdivided by coal-bunkers and store-rooms; in addition to these, a coffer-dam 5 feet in width will be worked next to the ship's side for the whole length of the vessel, in bunkers this will be filled with patent fuel forming a wall 5 feet thick against machine-gun fire, the contents can also be utilized as fuel in an emergency; forward and abaft the coal-bunkers, the coffer-dam will be filled with some water-excluding substance similar to "woodite."

In wake of the 4-inch and machine guns, the ship's side will be armored with 4 and 2 inch plates.

The 6-inch guns are mounted in the open, protected by heavy shields attached to the gun-carriages.

The accommodations for officers and crew are spacious, well ventilated and lighted. All the most approved modern appliances for exhausting the vitiated air, and for incandescent lighting by electricity have been incorporated in the design.

The coal capacity is very large, reaching 2,000 tons; at 10 knots speed per hour this will give the vessel an endurance of 109 days, or a radius of action of 26,240 knots

In appearance the vessel resembles closely an ordinary merchantman, the sides being nearly clear of projections of sponsons which ordinarily appear on vessels of war; she will have two signal masts, will have no military tops on them, however.

The function of the vessel is to destroy the commerce of an enemy; therefore, her general appearance is such as to enable her to get within range before her character is discovered.

As a whole, this vessel will represent the latest idea of a powerful, economical, protected commerce-destroyer.

The hull will be of steel; the vitals of the ship and its stability well protected, and the gun stations shielded against machine guns.

The subdivision of the hull is such as to form a double hull below the water, and offers as great security against damage from torpedo attack as can be given in a vessel of this class.

The Bureau with great satisfaction presents this review of what has been done and is doing in the building up of a navy suited to the needs of the United States. What has been done is an earnest of what may be done. The requirements have been as severe as those of any nation in the world, and the fact that in most cases such requirements have been exceeded, and in all cases realized, shows that class per class, our vessels are second to none, the only condition with which our people will be satisfied.

I am, sir, very respectfully,

THEODORE D. WILSON,
Chief Constructor, U. S. N.,
Chief of Bureau.

Hon. B. F. TRACY,
Secretary of the Navy.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the Bureau of Construction and Repair, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for current fiscal year, June 30, 1891.
A.—SALARIES.			
Chief clerk (*increase of $700 submitted) (appropriated act July 11, 1890)	$2,500.00		
One draughtsman (appropriated act July 11, 1890)	1,800.00		
One assistant draughtsman (appropriated act July 11, 1890)	1,600.00		
One assistant draughtsman (appropriated act July 11, 1890)	1,400.00		
One clerk of class four (appropriated act July 11, 1890)	1,800.00		
One clerk of class three (appropriated act July 11, 1890)	1,600.00		
One clerk of class two (appropriated act July 11, 1890)	1,400.00		
One clerk of class one (appropriated act July 11, 1890)	1,200.00		
One assistant messenger (appropriated act July 11, 1890)	720.00		
One laborer (appropriated act July 11, 1890)	660.00		
		$14,680.00	$13,980.00
*Extract from Report of Chief of Bureau: "The chief clerk, under the law, acts as Chief of the Bureau in case of the death, illness, resignation, or absence of that officer, and must be competent to take charge of the Bureau. The duties of this office are arduous, and fully deserve an increase of salary to $2,500 per annum, which is earnestly recommended."			
B.—CONSTRUCTION AND REPAIR OF VESSELS.			
Preservation and completion of vessels on the stocks and in ordinary. Purchase of materials and stores of all kinds. For steam steerers, pneumatic steerers, steam capstans, steam windlasses, and other steam auxiliaries; labor in navy-yards and on foreign stations, purchase of machinery and tools for use in shops; wear, tear and repair of vessels afloat, and for general care, increase, and protection of the Navy in the line of construction and repair; incidental expenses, such as advertising, freight, foreign postage, telegrams, telephone service, photographing, books, professional magazines, plans, stationery, and instruments for draughting-room (appropriated.)	1,000,000.00	1,000,000.00	1,000,000.00
C.—CIVIL ESTABLISHMENT.			
At navy-yard, Portsmouth, N. H.:			
One clerk to naval constructor (appropriated)	1,400.00		
Two writers, at $1,017.25 each (appropriated)	2,034.50		
At navy-yard, Boston, Mass.:			
One clerk to naval constructor (appropriated)	1,400.00		
At navy-yard, New York, N. Y.:			
One clerk to naval constructor (appropriated)	1,400.00		
Three writers, at $1,017.25 each (appropriated)	3,051.75		
At navy-yard, League Island, Pa.:			
One clerk to naval constructor (appropriated)	1,400.00		
At navy-yard, Washington, D. C.:			
One clerk to naval constructor (appropriated)	1,400.00		
At navy-yard, Norfolk, Va.:			
One clerk to naval constructor (appropriated)	1,400.00		
Two writers, at $1,017.25 each (appropriated)	2,034.50		
At navy-yard, Pensacola, Fla.:			
One writer, at $1,017.25 (appropriated)	1,017.25		
At navy-yard, Mare Island, Cal.:			
One clerk to naval constructor (appropriated)	1,400.00		
Two writers, at $1,017.25 each (appropriated)	2,034.50		
		19,972.50	19,972.50
D.—INCREASE OF THE NAVY.			
On account of the hulls and outfits of vessels heretofore authorized by Congress (appropriated)	$8,855,433.00	8,855,433.00	

APPENDIX E.

Vessels repaired at the several navy-yards and stations during the fiscal year 1889-'90.

Name.	Amount.	Name.	Amount.
Adams	$21.58	Mayflower	$590.68
Alarm	6,751.81	Minnesota	1,975.12
Alert	12,462.51	Monongahela	2,464.57
Alliance	40,119.84	Montauk	585.79
Atlanta	1,149.60	Monterey	1,263.32
Boston	8,906.22	Nantucket	1,785.03
Brooklyn	4,089.56	New Hampshire	1,679.63
Catalpa	724.94	Nina	815.63
Constellation	14,201.31	Ossipee	2,733.33
Constitution	523.15	Pensacola	33,799.76
Cushing	1,479.57	Phlox	102.60
Dale	1,439.90	Pinta	4,262.58
Despatch	326.03	Portsmouth	4,731.47
Dolphin	4,210.64	Quinnebaug	558.94
Emerald	24.05	Ranger	10,784.96
Enterprise	10,235.36	Rocket	165.55
Essex	43,681.10	Saratoga	21,038.63
Fortune	540.51	Speedwell	673.35
Franklin	1,316.51	Standish	1,150.95
Galena	9,755.95	St. Louis	397.91
Independence	2,694.79	Triana	231.77
Iroquois	20,053.17	Triton	4,410.92
Jamestown	2,894.90	Vermont	2,543.65
Jason	249.84	Wyoming	236.23
Kearsarge	1,591.89	Yantic	17,581.67
Lancaster	40,738.07	Boats, launches, etc	19,908.00
Leyden	165.37		
Marion	462.84	Total	367,283.05

Vessels remaining under repairs June 30, 1890.

Navy-yard.	Name of vessel.
Kittery	Lancaster.
New York	Enterprise, Minnesota, Pensacola, Essex, and Triana.
Mare Island	Alert, Independence, Marion, Ranger.

APPENDIX F.

Amounts expended under the different appropriations for the fiscal year 1889-'90.

CONSTRUCTION AND REPAIR.

Amount appropriated		$850,000.00
Amount received from transfers		48,676.26
Total		898,676.26
Expended for labor at navy-yards and stations	$618,501,45	
Expended for purchase of materials, tools for yards, advertising, foreign postage, telegrams, instruments for draughting-room, etc	153,550.91	
Expended on account of transfers	2,646.82	
Expended on account of foreign stations	7,163.08	
		781,862.26
Balance on hand July 1, 1890		116,814.00
Expended on account of foreign bills (adjusted in July, 1890)		59,866.21
Balance		56,947.79

This balance is required to pay the indebtedness of the Bureau.

CIVIL ESTABLISHMENT.

Appropriated	$19,972.50
Expended for clerks and writers at navy-yards	19,737.82
Balance on hand July 1, 1890	234.68

IMPROVEMENT OF PLANTS.

Improvement of plant, navy-yard, Mare Island, Cal. (act September 7, 1888):	
Expended during the year	55,829.34
Improvement of construction plant, navy-yard, Brooklyn, N. Y. (act March 2, 1889):	
Expended during the year	28,090.28
Improvement of construction plant, navy-yard, Norfolk, Va. (act March 2, 1889):	
Expended during the year	16,369.48

STEAM-TUGS.

Purchase or construction of four steam-tugs (act March 2, 1889):	
Expended during the year	35,185.35

INCREASE OF THE NAVY.

Vessels authorized March 3, 1885:	
Expended during the year	4,591.78
Vessels and monitors, act of August 3, 1886:	
Expended during the year	148,011.90
Monitors and vessels, acts of March 3, 1885, and August 3, 1886:	
Expended during the year	145,922.94
Gun-boats and cruisers, act of March 3, 1887:	
Expended during the year	29,314.67
Vessels for coast and harbor defense, act of March 3, 1887:	
Expended during the year	9,361.14
Construction and machinery, acts of September 7, 1888, and March 2, 1889:	
Expended during the year	1,249,244.67

APPENDIX G.

Amounts expended on new vessels at several navy-yards, and for outfit of other vessels building under contract, and amounts expended for draughtsmen, etc., during the fiscal year 1889-'90.

Name of vessel.	Expended on construction of hull, labor and material.	Expended for masts, spars, boats, and other outfits.	Expended for draughtsmen, writers, copyists, model-makers, etc.	Total.
Newark		$22,743.90	$9,026.10	$31,770.00
Charleston	*$38,307.66	38,259.44	10,403.26	86,970.36
Yorktown		7,424.80	1,580.83	9,005.63
Petrel	*18,463.37	5,842.60	2,023.23	26,329.20
Baltimore	*15,969.50	11,871.99	8,974.16	36,815.65
Maine	455,163.79		9,561.45	464,725.24
Texas	117,885.00		8,722.66	126,607.66
Vesuvius			5,109.23	5,109.23
Philadelphia		50,620.82	9,238.19	59,859.01
San Francisco		21,558.93	13,819.37	35,378.30
Concord		19,313.17	6,565.61	25,878.78
Bennington		14,754.35	5,412.15	20,166.50
Armored cruiser No. 2			7,629.15	7,629.15
Protected cruiser No. 6			6,464.18	6,464.18
Cruiser No. 7	75,120.38		5,516.10	80,636.48
Cruiser No. 8	65,594.09		8,193.51	73,787.60
Cruiser No. 9			3,075.48	3,075.48
Cruiser No. 10			3,075.58	3,075.58
Cruiser No. 11			3,007.83	3,007.83
Gun-boat No. 5			2,193.11	2,193.11
Gun-boat No. 6			2,173.71	2,173.71
Monterey			8,902.17	8,902.17
Ram for harbor defense			1,298.97	1,298.97
Armored steel cruising monitor			2,953.58	2,953.58
Steel practice vessel			2,848.49	2,848.49
New tug-boats			2,075.70	2,075.70
Total	786,503.79	192,390.00	149,843.80	1,128,737.59

* In addition to payments under contract.

Amounts expended on new vessels at several navy-yards and for outfit of other vessels building under contract, and amounts expended for draughtsmen, etc.—Continued.

Name of vessel.	Expended in completion of monitors authorized under act of August 3, 1886; labor and material.	Expended for draughtsmen, writers, copyists, model-makers, etc.	Total.
Puritan	$31, 546. 81	$4, 372. 58	$35, 919. 39
Monadnock	13, 814. 76	1, 965. 63	15, 780. 39
Terror	99, 183. 30	5, 929. 20	105, 112. 50
Amphitrite	13, 027. 12	4, 368. 67	17, 395. 79
Miantonomoh	122, 203. 24	3, 539. 83	125, 743. 07
Total	279, 775. 23	20, 175. 91	299, 951. 14

APPENDIX H.

Payments made on account of vessels building under contracts, under appropriation "Increase of the Navy," to and including October 1, 1890, together with balance due.

Name of vessel.	Contract price.	Payments.		Reservations retained.	Penalties retained.	Balance due on contracts including reservations.
		No.	Amount.			
Newark	$1, 248, 000. 00	9	$992, 030. 00	$112, 320. 00	$18, 850. 00	$237, 120. 00
Charleston	1, 017, 500. 00	10	979, 729. 98	....	37, 770. 02	....
Yorktown	455, 000. 00	10	447, 425. 00	....	7, 575. 00	....
Petrel	247, 000. 00	10	190, 065. 00	....	56, 935. 00	....
Baltimore	1, 325, 000. 00	10	1, 317, 325. 00	....	7, 675. 00	....
Vesuvius	350, 000. 00	10	289, 550. 00	20, 750. 00	39, 700. 00	20, 750. 00
Philadelphia	1, 350, 000. 00	10	1, 295, 450. 00	35, 000. 00	19, 550. 00	35, 000. 00
San Francisco	1, 428, 000. 00	9	1, 156, 680. 00	128, 520. 00	....	271, 320. 00
Concord	490, 000. 00	9	373, 750. 00	44, 100. 00	23, 150. 00	93, 100. 00
Bennington	490, 000. 00	9	368, 350. 00	44, 100. 00	28, 550. 00	93, 100. 00
Monterey	1, 628, 950. 00	4	586, 422. 00	65, 158. 00	....	1, 042, 528. 00
Cruiser No. 9	612, 500. 00	6	165, 375. 00	18, 375. 00	....	447, 125. 00
Cruiser No. 10	612, 500. 00	6	165, 375. 00	18, 375. 00	....	447, 125. 00
Cruiser No. 11	674, 000. 00	1	30, 330. 00	3, 370. 00	....	643, 670. 00
	11, 928, 450. 00	....	8, 357, 856. 98	490, 068. 00	239, 755. 02	3, 330, 838. 00

Remarks.—In addition to contract price there was paid—

Charleston:	
For trial trip expenses	$20, 551. 89
For labor and materials, extra	62, 613. 91
	83, 165. 80
Yorktown:	
For premiums	39, 825. 00
For changing plans, etc	13, 712. 05
For trial trip expenses	3, 201. 16
For labor and material, extra	2, 046. 76
	58, 784. 97
Petrel:	
For labor and materials, extra	3, 440. 85
For trial trip expenses	1, 985. 10
	5, 425. 95
Baltimore:	
For premiums	106, 441. 80
For labor and materials, extra	35, 614. 14
For trial trip expenses	13, 912. 31
	155, 968. 25
Philadelphia:	
For trial trip expenses	17, 427. 62
Concord:	
For labor and materials, extra	3, 995. 44
Bennington:	
For labor and materials, extra	543. 44

APPENDIX I.—*Tables of*

ARMORED

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse-power.
					Length on load water line.	Breadth.	Mean draught.		
					Ft. In.	*Ft. In.*	*Ft. In.*	*Tons.*	
Puritan	Iron low free-board barbette-turret coast-defense.	1875	John Roach, Chester, Pa.	In course of completion at U. S. navy-yard, Brooklyn, N. Y.	289 6	60 1½	18 0	6,060	3,700
Miantonomoh	Iron double-turret.	1874	...do	...do	259 6	55 10	14 6	3,990	1,426
Amphitrite	Iron low free-board barbette-turret coast-defense.	1874	Harlan & Hollingsworth, Wilmington, Del.	In course of completion at U. S. navy-yard, Norfolk, Va.	259 6	55 10	14 6	3,990	1,600
Monadnock	...do	1874	U. S. navy-yard, Mare Island.	In course of completion.	259 6	55 10	14 6	3,990	3,000
Terror	Iron double-turret.	1874	Wm. Cramp & Sons, Philadelphia, Pa.	In course of completion at U. S. navy-yard, Brooklyn, N. Y.	259 6	55 10	14 6	3,990	1,600
Texas	Armored steel battle-ship.	1889	U. S. navy-yard, Norfolk, Va.	Building	301 4	64 7	22 6	6,300	8,600
Maine	Armored steel cruiser	1889	U. S. navy-yard, Brooklyn, N. Y.	...do	318 0	57 0	21 6	6,648	9,000
Monterey	Steel low free-board barbette coast-defense.	1889	Union Iron Works, San Francisco, Cal.	...do	256 0	59 0	14 9	4,048	5,400
——	Armored steel cruising monitor.	....	....	Plans and specifications completed.	235 0	55 0	14 6	3,130	7,500
No. Two	Armored steel cruiser.	1890	Wm. Cramp & Sons, Philadelphia, Pa.	Building.	380 6½	64 10	23 3½	8,150	16,500
——	Steel harbor-defense ram.	....	Advertisement for proposals issued by Department.	Plans and specifications completed.	242 9	43 5	15 0	2,050	4,800
Coast-line battle ship No. 1.	Steel, belted cruiser.	....	Wm. Cramp & Sons, Philadelphia.	Building	348 0	69 3	24 0	10,200	9,000
Coast-line battle ship No. 2.	...do	....	...do	...do	348 0	69 3	24 0	10,200	9,000
Coast-line battle ship No. 3.	...do	....	Union Iron Works, San Francisco, Cal.	...do	348 0	69 3	24 0	10,200	9,000

vessels of the U. S. Navy.

VESSELS.

Type of engine.	Speed in knots per hour.	Batteries.		Armor.		Cost of hull and machinery.	Date of act authorizing building or completion.
		Main.	Secondary.	Sides.	Turrets and barbettes.		
				In.	*In.*		
Twin-screw horizontal compound.	12.4	4 12″ B. L. R. 6 4″ B. L. R.	2 6-pdr. R. F. 4 3-pdr. R. F. 4 37mm H. R. C. 4 Gatlings.	14	14	Appropriated to complete, $3,178,046.	Mar. 3, 1885, Aug. 3, 1886, Mar. 3 1887.
Twin-screw inclined compound.	10.5	4 10″ B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	7	11½		Mar. 3, 1885, Aug. 3, 1886, Mar. 3, 1887.
....do	12	4 10″ B. L. R. 2 4″ B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	9	11½		Mar. 3, 1885, Aug. 3, 1886, Mar. 3, 1887.
Twin-screw horizontal, triple expansion.	14.5	4 10″ B. L. R. 2 4″ B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	9	11½		Mar. 3, 1885, Aug. 3, 1886, Mar. 3. 1887.
Twin-screw inclined compound.	12	4 10″ B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	7	11½		Mar. 3, 1885, Aug 3, 1886, Mar. 3 1887.
Twin-screw vertical, triple expansion.	17	2 12″ B. L. R. 6 6″ B. L. R.	12 6-pdr. R. F. 4 1-pdr. R. F. 4 37mm H. R. C. 2 Gatlings.	12	12	*$2,500,000	Aug. 3, 1886.
....do	17	4 10″ B. L. R. 6 6″ B. L. R.	12 6-pdr. R. F. 6 1-pdr. R. F. 4 Gatlings.	12	12	*2,500,000	Aug. 3, 1886.
....do	16	2 12″ B. L. R. 2 10″ B. L. R.	6 6-pdr. R. F. 4 1-pdr. R. F. 2 Gatlings.	13	13	†1,628,950	Mar. 3, 1887.
....do	17	2 10″ B. L. R. 1 6″ B. L. R. 1 15″ dynamite.	3 3-pdr. R. F. 1 37mm H. R. C.	5	10	*1,500,000	Mar. 2, 1889.
....do	20	6 8″ B. L. R. 12 4″ B. L. R.	8 6-pdr. R. F. 4 1-pdr. R. F. 4 Gatlings.	3⅞	10	†2,985,000	Sept. 7, 1888.
....do	17	None	None	6	......	....	Mar. 2, 1889.
....do	15	4 13″ B. L. R. 8 8″ B. L. R. 4 6″ B. L. R.	16 6-pdr. R. F. 4 1-pdr. R. F, 4 Gatlings.	18	17	†3,020,000	June 30, 1890.
....do	15	4 13″ B. L. R. 8 8″ B. L. R. 4 6″ B. L. R.	16 6-pdr. R. F. 4 1-pdr. R. F. 4 Gatlings.	18	17	†3,020,000	June 30, 1890.
....do	15	4 13″ B. L. R. 8 8″ B. L. R. 4 6″ B. L. R.	16 6-pdr. R. F. 4 1-pdr. R. F. 4 Gatlings.	18	17	†3,180,000	June 30, 1890.

*Limit. †Contract price.

APPENDIX I.—*Table of vessels*

SINGLE TURRET

Name.	Type.	Keel laid.	By whom and where built.	Condition.	Dimensions.			Displacement.	Indicated horse-power.
					Length between perpendiculars.	Breadth.	Mean draught.		
					Ft. In.	*Ft. In.*	*Ft. In.*	*Tons.*	
Ajax	Low free-board single-turret monitor.	1862	Snowden & Mason, Pittsburgh, Pa.	In ordinary	225	43 8	13 6	2,100	340
Comanche	...do	1862	Donohue, Ryan & Secor, Jersey City, N. J.	...do	200	46	11 6	1,875	340
Canonicus	...do	1862	Harrison Loring, Boston, Mass.	...do	225	43 8	13 6	2,100	340
Catskill	...do	1862	John Ericsson, Brooklyn, N. Y.	...do	200	46	11 6	1,875	340
Jason	...do	1862	John Ericsson, Chester, Pa.	...do	200	46	11 6	1,875	340
Lehigh	...do	1862	...do	...do	200	46	11 6	1,875	340
Mahopac	...do	1862	Z. and F. Secor, Jersey City, N. J.	...do	225	43 8	13 6	2,100	340
Manhattan	...do	1862	Perine, Secor & Co., Jersey City, N. J.	...do	225	43 8	13 6	2,100	340
Montauk	...do	1862	John Ericsson, Brooklyn, N. Y.	...do	200	46	11 6	1,875	340
Nahant	...do	1862	Harrison Loring, Boston, Mass.	...do	200	46	11 6	1,875	340
Nantucket	...do	1862	Atlantic Works, Boston, Mass.	...do	200	46	11 6	1,875	340
Passaic	...do	1862	John Ericsson, Brooklyn, N. Y.	...do	200	46	11 6	1,875	340
Wyandotte	...do	1862	Miles Greenwood, Cincinnati, Ohio.	...do	225	43 8	13 6	2,100	340

of the U. S. Navy—Continued.

MONITORS (IRON).

Type of engine.	Speed in knots.	Batteries.		Armor.		Cost of hull and machinery.	Date of act authorizing building.
		Main.	Secondary.	Sides.	Turret.		
				Ins.	*Ins.*		
Single-screw grass-hopper.	5 to 6	2 XV″ S. B ...	None	5	10	$626, 582. 24	April 17, 1862
....do	5 to 6	None	....do	5	11	613, 164. 98	Do.
....do	6	2 XV″	2 12-pdr. H.	5	10	622, 963. 22	Do.
....do	6	....do	None	5	11	427, 766. 78	Do.
....do	5 to 6	....do	....do	5	11	422, 766. 73	Do.
....do	5 to 6	....do	....do	5	11	422, 726. 28	Do.
....do	6	....do	....do	5	10	635, 374. 55	Do.
....do	6	....do	....do	5	10	628, 879. 27	Do.
....do	5 to 6	....do	....do	5	11	423, 027. 49	Do.
....do	5 to 6	....do	....do	5	11	413, 515. 14	Do.
....do	5 to 7	....do	....do	5	11	408, 091. 37	Do.
....do	5 to 6	....do	1 12-pdr. H.	5	11	423, 171. 69	Do.
....do	6	....do	1 12-pdr. H.	5	10	633, 327. 84	Do.

Appendix I.—*Table of vessels of*

UNARMORED

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse-power.
					Length on load-water line.	Breadth.	Mean draught.		
					Ft. In.	*Ft. In.*	*Ft In.*	*Tons.*	
Chicago	Protected cruiser.	1883	John Roach, Chester, Pa.	Squadron of evolution.	325 0	48 2	19 0	4,500	5,084
Boston	...do	1883	...do	...do	270 3	42 0	17 0	3,189	4,030
Atlanta	...do	1883	...do	...do	270 3	42 0	17 0	3,189	4,030
Dolphin	Dispatch boat.	1883	...do	North Atlantic Station.	240 0	32 0	14 3	1,485	2,240
Newark	Protected cruiser.	1887	Wm. Cramp & Sons, Philadelphia, Pa.	Ready for trial.	310 0	49 2	18 9	4,083	8,500
Charleston	...do	1887	Union Iron Works, San Francisco, Cal.	Flag-ship Pacific Station.	312 0	46 0	19 7	4,040	6,666
Baltimore	...do	1887	Wm. Cramp & Sons, Philadelphia, Pa.	Flag-ship European Station.	327 6	48 6	20 6	4,600	10,064
San Francisco	...do	1888	Union Iron Works, San Francisco, Cal.	....	310 0	49 2	18 9	4,083	10,400
Philadelphia	...do	1888	Wm. Cramp & Sons, Philadelphia, Pa.	Flag-ship North Atlantic Station.	327 6	48 6	19 2½	4.324	8,815
No. Six	...do	1890	Union Iron Works, San Francisco, Cal.	Building.	340 0	53 0	21 6	5,500	13,500
No. Seven	...do	1890	U. S. navy-yard, Brooklyn, N. Y.	...do	300 0	42 0	18 0	3,183	10,000
No. Eight	...do	1889	U. S. navy-yard, Norfolk, Va.	...do	300 0	42 0	18 0	3,183	10,000
No. Nine	Cruiser	1890	Columbian Iron Works, Baltimore, Md.	...do	257 0	37 0	14 6	2,000	5,400
No. Ten	...do	1890	...do	...do	257 0	37 0	14 6	2,000	5,400
No. Eleven	...do	....	City Point Works, Boston, Mass.	...do	257 0	37 0	14 6	2,000	5,400
No. Twelve	Protected cruiser.	....	Wm. Cramp & Sons, Philadelphia, Pa.	...do	400 0	58 0	23 0	7,400	21,000

the U S Navy—Continued.

STEEL VESSELS.

Type of engine.	Speed in knots per hour.	Batteries.		Cost of hull and machinery.	Date of act authorizing the building.	Contract signed.	Time to complete from date of contract.
		Main.	Secondary.				
							Mos.
Twin-screw, compound, overhead beam.	14.0	4 8″ B. L. R.. 8 6″ B. L. R. 2 5″ B. L. R.	2 6-pdr. R. F... 2 1-pdr. R. F. 4 47^{mm} H. R. C. 2 37^{mm} H. R. C. 2 Gatlings.	*$889,000	Mar. 3, 1883	July 26, 1883	......
Single-screw horizontal compound.	15.6	2 8″ B. L. R... 6 6″ B. L. R.	2 6-pdr. R. F... 2 3-pdr. R. F. 2 1-pdr. R. F. 2 47^{mm} H. R. C. 2 37^{mm} H. R. C. 2 Gatlings.	*619,000	....do	July 23, 1883	......
....do	15.6	2 8″ B. L. R... 2 6″ B. L. R.	2 6-pdr. R. F... 2 3-pdr. R. F. 2 1-pdr. R. F. 2 47^{mm} H. R. C. 2 37^{mm} H. R. C. 2 Gatlings.	*617,000	....do	....do	......
Single-screw vertical compound.	15.5	1 6″ B. L. R.	2 6-pdr. R. F... 4 47^{mm} H. R. C. 2 Gatlings.	*315,000	....do	....do	......
Twin-screw horizontal, triple expansion.	18.0	12 6″ B. L. R..	4 6-pdr. R. F... 4 3-pdr. R. F. 2 1-pdr. R. F. 2 37^{mm} H. R. C. 4 Gatlings.	*1,248,000	Mar. 3, 1885	Oct. 27, 1887	......
Twin-screw horizontal, compound.	18.205	2 8″ B. L. R... 6 6″ B. L. R.	4 6-pdr. R. F... 2 3-pdr. R. F. 2 1-pdr. R. F. 4 37^{mm} H. R. C. 2 Gatlings.	*1,017,000	....do	Dec. 28, 1886	......
Twin-screw horizontal, triple expansion.	19.575	4 8″ B. L. R... 6 6″ B. L. R.	4 6-pdr. R. F... 2 3-pdr. R. F. 2 1-pdr. R. F. 4 37^{mm} H. R. C. 2 Gatlings.	*1,325,000	Aug. 3, 1886	Dec. 17, 1886	18
....do	20.17	12 6″ B. L. R..	4 6-pdr. R. F... 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37^{mm} H. R. C. 4 Gatlings.	*1,428,000	Mar. 3, 1887	Oct. 26, 1887	24
....do	19.678	12 6″ L. B. R..	4 6-pdr. R. F... 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37^{mm} H. R. C. 4 Gatlings.	*1,350,000	....do	Oct. 27, 1887	24
Twin-screw vertical triple expansion.	20.0	4 8″ B. L. R... 10 5″ B. L. R.	14 6-pdr. R. F.. 6 1-pdr. R. F. 4 Gatlings.	*1,796,000	Sept. 7, 1888	July 10, 1890	Apr. 1, 1893
....do	19.0	1 6″ B. L. R... 10 4″ B. L. R.	8 6-pdr. R. F... 4 1-pdr. R. F. 2 Gatlings.	†1,100,000	....do	....	......
....do	19.0	1 6″ B. L. R... 10 4″ B. L. R.	8 6-pdr. R. F... 4 1-pdr. R. F. 2 Gatlings.	†1,100,000	....do	....	......
....do	17.0	2 6″ B. L. R... 8 4″ B. L. R.	6 6-pdr. R. F... 2 1-pdr. R. F. 2 Gatlings.	*612,500	....do	Nov. 2, 1889	30
....do	17.0	2 6″ B. L. R... 8 4″ B. L. R.	6 6-pdr. R. F... 2 1-pdr. R. F. 2 Gatlings.	*612,500	....do	....do	30
....do	17.0	2 6″ B. L. R... 8 4″ B. L. R.	6 6-pdr. R. F... 2 1-pdr. R. F. 2 Gatlings.	*612,500	....do	Nov. 11, 1889	30
Triple-screw vertical triple expansion.	21.0	1 8″ B. L. R... 2 6″ B. L. R. 12 4″ B. L. R.	16 6-pdr. R. F.. 8 1-pdr. R. F... 4 Gatlings.	*2,725,000	June 30, 1890	....	30

* Contract price.

† Limit.

APPENDIX I.—*Table of vessels of*

UNARMORED STEEL

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse-power.
					Length on load-water line.	Breadth.	Mean draught.		
GUN-BOATS.					*Ft. In.*	*Ft. In.*	*Ft. In.*	*Tons.*	
Yorktown	Gun-boat	1887	Wm. Cramp & Sons, Philadelphia. Pa.	Squadron of Evolution.	234 0	36 0	14 0	1,700	3,660
Concord	do	1888	N. F. Palmer, jr. & Co., Chester, Pa.	Building	234 0	36 0	14 0	1,700	3,400
Bennington	do	1888	do	do	234 0	36 0	14 0	1,700	3,400
Petrel	do	1887	Columbian Iron Works.	North Atlantic Station.	176 3	31 0	11 7	890	1,045
No. 5	do		Bath Iron Works, Bath, Me.	Building	190 0	32 0	12 0	1,050	1,600
No. 6	do		do	do	190 0	32 0	12 0	1,050	1,600
SPECIAL CLASS.									
Practice cruiser	Cruiser for Naval cadets.		Moore & Son's, Elizabethport, N. J.	do	187 6	32 0	11 6	838	1,300
Vesuvius	Dynamite Cruiser.	1887	Wm. Cramp & Sons, Philadelphia, Pa.	Commissioned	251 9	26 5	9 0	725	3,794.86
Dynamite Cruiser No. 2.				Subject to orders from the Department.					
Torpedo Cruiser				Advertisement for proposals has been issued by Department.					
TORPEDO BOATS.									
Stiletto	Torpedo-boat, wood.		Purchased from the Herreschoff M'f'g. Co.		94 0 (1)	11 0	4 10	31	359
Cushing	Torpedo-boat, steel.	1889	Herreschoff M'f'g. Co., Bristol, R. I.	Commissioned	138 9 (1)	14 10	5 3	116	1,720
No. 2	Torpedo-boat, steel.			Advertisement for proposals issued by Department.					

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[1] Length between perpendiculars.

the U. S. Navy—Continued.

VESSELS—Continued.

Type of engine.	Speed in knots per hour.	Batteries.		Cost of hull and machinery.	Date of act authorizing the building.	Contract signed.	Time to complete from date of contract.
		Main.	Secondary.				*Mos.*
Twin-screw, horizontal triple expansion.	16.65	6 6" B. L. R..	2 6-pdr. R. F.. 2 3-pdr. R. F. 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatling.	*$455,000	Mar. 3, 1875	Jan. 31, 1886	12
....do	16.	....do	2 6-pdr. R. F. 2 3-pdr. R. F. 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatling.	* 490,000	Mar. 3, 1887	Nov. 15, 1887	18
....do	16.	8 5" B. L. R..	2 6-pdr. R. F. 2 3-pdr. R. F. 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatling.	* 490,000	....do	....do	18
Single-screw, horizontal compound	11.55	4 6" B. L. R..	2 3-pdr. R. F. 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatling.	* 247,000	Mar. 3, 1885	Dec. 22, 1886	12
Twin-screw, vertical triple expansion.	14.	8 4" B. L. R..	4 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatling.	* 318,000	Mar. 2, 1889	Apr. 12, 1890	24
....do	14.	....do	4 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatling.	* 318,000	....do	....do	24
....do	13.	4 4" B. L. R..	2 6-pdr. R. F. 2 3-pdr. R. F. 1 1-pdr. R. F. 1 37mm H. R. C. 1 Gatling.	* 250,000	Sept. 7, 1888	July 18, 1890	24
Twin-screw, vertical.	21.5	3 dynamite guns, 15" cal.	3 3-pdr. R. F.	* 350,000	Aug. 3, 1886	Feb. 11, 1887	12
....	......	....	....	....	....	....	.....
....	......	....	....	† 350,000	June 30, 1890	....	.....
....	18.22	....	....	....	....	....	.....
Twin-screw, vertical quadruple expansion.	22.50	Three torpedo tubes.	3 1-pdr. R. F.	* 82,750	Mar. 3, 1887	Mar. 1, 1888	15
....	......	....	....	† 125,000	June 30, 1890	....	.....

* Contract price. † Limit.

APPENDIX I.—*Table of vessels*

IRON AND WOODEN

Name.	Built.			Condition or service.	Rig.
	When.	Where.	By whom.		
IRON.					
Ranger	1873-1876	Wilmington, Del	Harlan & Hollingsworth.	Pacific Station	Bark
Alert	1873-1875	Chester, Pa	John Roach	do	do
Monocacy	1863	Baltimore, Md	A. and W. Denmead & Son.	Asiatic Station	Schooner
Michigan	1844	Erie, Pa	United States	Northwestern lakes	Barkentine
Palos	1865	Boston, Mass	James Tetlow	Asiatic Station	Schooner
Pinta	1865	Chester, Pa	Reany, Son & Archbold.	Pacific Station	do
Alarm	1874	New York, N. Y.	United States	Fitting as gunnery ship for Training Squadron.	
WOODEN.					
Lancaster	1858	Philadelphia, Pa.	do	U. S. navy-yard Portsmouth, N. H., fitting as gunnery ship for training squadron.	Ship
Pensacola	1858-1862	Pensacola, Fla.	do	Flagship, South Atlantic Station.	do
Richmond	1858	Norfolk, Va	do	Norfolk, Va., in ordinary.	do
Omaha	1867-1869	Philadelphia, Pa.	do	Asiatic Station	Bark
Swatara	1872	New York	do	do	Ship
Galena	1871-1878	Norfolk	do	Out of commission	do
Marion	1871-1875	Kittery	do	Asiatic Station	Bark
Mohican	1872-1883	Mare Island	do	Pacific Station	do
Iroquois	1858	New York	do	do	Ship
Kearsarge	1861	Kittery	do	North Atlantic Station.	Bark
Adams	1874-1876	Boston	United States and Donald McKay.	Pacific Station	do
Alliance	1873-1876	Norfolk	United States	Repairing at U. S. navy-yard, Norfolk.	do
Essex	1874-1876	Kittery and Boston.	Donald McKay and United States.	South Atlantic Station.	do

of the U. S. Navy—**Continued.**

STEAM VESSELS.

Dimensions.			Displacement.	Indicated horse-power.	Speed in knots per hour.	Batteries.		Coal capacity.	Complement.	
Length between perpendiculars.	Breadth.	Mean draught.				Main.	Secondary.		Officers.	Men.
Ft. In.	*Ft. In.*	*Ft. In.*	*Tons.*					*Tons.*		
175	32	12 9	1,020	365	10.	1 XI″ S. B 2 IX″ S. B 1 60-pdr. M. L. R.	1 3″ B. L. H 1 Gatling.	*126	21	127
175	32	12 9	1,020	365	10.	2 IX″ S. B 1 XI″ S. B. 1 60-pdr. B. L. R.	1 3″ B. L. H 1 12-pdr. S. B. howitz.	*133	21	127
255	35	9	1,370	850	11.2	4 VIII″ S. B 2 60-pdr. B. L. R.	1 3″ B. L. H 1 12-pdr. S. B. howitz. 6 H. R. C. 1 Gatling.	†224	12	114
163 3	27 1½	9	685	305	10.5	4 30-pdr. B. L. R	3 3″ B. L. H 2 Gatling.	*135	......	......
137	26	9 9	420	246	10.35	4 24-pdr. S. B. howitz. 2 20-pdr. R. howitz.	1 12-pdr. S. B. howitz. 2 37mm H. R. C. 1 Gatling.	*102	9	49
137	26	11 0	550	190	8.5	4 12-pdr. S. B. howitz.	1 Gatling	*111	8	37
158 6	28	10 6	800	600	10.	1 6″ B. L. R.	2 3-pdr. R. F 1 37mm H. R. C.	*405	......	......
235 8	46	19 2	3,250	733	9.6	1 8″ B. L. R. 2 6″ B. R. R. 2 4″ B. L. R.	4 6-pdr. R. F 4 3-pdr. R. F. 2 1-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	†288	......	......
230 8	44 6	18 7	3,000	680	9	12 IX″ S. B 2 80-pdr. B. L. R. 2 60-pdr. B. L. R.	1 3″ B. L. H 2 20-pdr. B. L. R. br. 4 37mm H. R. C. 1 long Gatling.	*285	26	351
225	42 6	17 4½	2,700	692	9.5	12 IX″ S. B 1 8″ M. L. R. 1 60-pdr. B. L. R.	2 20-pdr. B. L. R 1 3″ B. L. H. 4 37mm H. R. C. 1 Gatling.	†265	29	321
250 6	38	16 6	2,400	953	11.3	10 IX″ S. B 1 8″ M. L. R. 1 60-pdr. B. L. R.	2 20-pdr. B. L. R 1 3″ B. L. H. 4 37mm H. R. C. 1 Gatling.	*150	22	269
216	37	16 6	1,900	680	10.1	6 IX″ S. B 1 8″ M. L. R. 1 60-pdr. B. L. R.	2 20-pdr. B. L. R 1 3″ B. L. H. 1 12-pdr. S. B. howtz. 1 Gatling.	*186	26	188
216	37	16 6	1,900	776	9.5	6 IX″ S. B 1 8″ M. L. R. 1 60-pdr. B. L. R.	1 3″ B. L. H. 1 Gatling.	*170	24	190
216	37	16 6	1,900	753	11.25		Battery landed	*135	18	176
216	37	16 6	1,900	613	10.65	8 IX″ S. B 1 8″ M. L. R. 1 60-pdr. B. L. R.	2 20-pdr. B. L. R 1 3″ B. L. H. 1 12-pdr. S. B. howtz. 2 37mm H. R. C. 1 Gatling.	*162	21	193
198 10	33 10	15 3	1,575	1,202	10.7	2 8″ M. L. R 4 60-pdr. M. L. 1 60-pdr. B. L. R.	1 12-pdr. S. B. howtz. 1 3″ B. L. H. 2 Gatlings.	*128	16	176
198 6	33	15 9	1,550	843	11.1	4 IX″ S. B 2 8″ M. L. R. 1 60-pdr. B. L. R.	1 3″ B. L. H 1 Gatling. 2 20-pdr. B. L. R.	*165	21	191
185	35	14 3	1,375	550	9.8		Battery landed.	*150	20	160
185	35	14 3	1,375	668	9.98	4 IX″ S. B 1 8″ M. L. R. 1 60-pdr. B. L. R.	1 3″ B. L. H 1 12-pdr. S. B. howtz. 1 Gatling.	*150	18	160
185	35	14 3	1,375	505	10.4	4 IX″ S. B 1 8″ M. L. R. 1 60-pdr. M. L. R.	1 3″ B. L. H 1 12-pdr. S. B. howtz. 1 Gatling.	†130	15	178

* Anthracite. † Bituminous.

APPENDIX I.—*Tables of vessels*

IRON AND WOOD

Name.	Built.			Material.
	When.	Where.	By whom.	
Catalpa	1864		Purchased	Wood
Cohasset	1861		do	do
Fortune	1865	Boston	John Tetlow	Iron
Leydon	1866	do	James Tetlow	do
Mayflower	1866	do	do	do
Monterey	1863		Purchased	Wood
Nina	1865	Chester	Reamy, Son & Archbold.	Iron
Rocket	1863		Purchased	Wood
Standish	1865	Boston	James Tetlow	Iron
Triana	1864	New York	Wm. Parine	do
Triton	1888	Camden, N. J.	Jno. H. Dialogue*	do
No. One				Steel
No. Two				do
No. Three				do

* Purchased by the Government September, 1889.

VESSELS UNFIT

Name.	Built.			Condition or service.	Rig or type.
	When.	Where.	By whom.		
IRON (STEAM).					
Intrepid	1874	Boston, Mass.	United States	At navy-yard, Brooklyn; hauled out for repairs; work abandoned.	Brig
Saugus	1862			Condemned at Washington.	Single-turret monitor.
Speedwell	1865	Boston, Mass.	James Tetlow	Condemned at Norfolk	Tug-boat
Rescue				Condemned at Washington.	do
WOODEN (STEAM).					
Brooklyn	1858	New York	Westervelt & Co.	At Norfolk, Va.; condemned.	Ship
Hartford	1856	Boston, Mass.	United States	At Mare Island, in ordinary.	do
Ossipee	1861	Kittery	do	At Norfolk; condemned.	Bark
Franklin	1855-1865	do	do	Receiving ship, Norfolk, Va.	Ship
Wabash	1854	Philadelphia	do	Receiving ship, Boston, Mass.	do
Minnesota	1855	Washington	do	Receiving ship for training squadron, New York.	do
SAILING.					
Constitution	1797	Boston, Mass.	do	Receiving ship, Portsmouth, N. H.	do
Independence	1837	do	do	Receiving ship, Mare Island.	do
St. Louis	1828	Washington	do	Receiving ship, League Island.	do
Dale	1839	Philadelphia	do	Receiving ship, Washington.	do

of the U. S. Navy—Continued.

STEAM TUGS.

Rig.	Dimensions.						Displacement.	Indicated horse-power.	Speed in knots.	Coal supply.
	Length between perpendiculars.		Breadth.		Mean draught.					
	Feet.	*In.*	*Feet.*	*In.*	*Feet.*	*In.*	*Tons.*			*Tons.*
....	...	...	...	...	...	...	...	...	...	...
....	97		19	6	6	6	188	....	....	....
Schooner	137		26		9	6	450	340	10	80
....do	137		26		9	6	450	340	10	80
....do	137		26		9	6	450	338	10.6	80
....	...	...	...	...	...	...	....	340	8.5	....
Schooner	137		26		8	6	357	340	10	80
....	85	8	18	10	7		187	147	8.5	....
Schooner	137		26		9	6	450	340	10	80
...do	137		26		9	6	450	340	10	80
....	96	9	20	9	9		212	300	13	45
....	92	6	20	11⅜	8		192.4	300	....	35
....	92	6	20	11⅜	8		192.4	300	....	35
....	92	6	20	11⅜	8		192.4	300	....	35

FOR SEA SERVICE.

Dimensions.			Displacement.	Indicated horse-power.	Speed, in knots.	Batteries.		Coal capacity.	Complement.	
Length between perpendiculars.	Breadth.	Mean draught.				Main.	Secondary.		Officers.	Men.
Ft. In	*Ft. In*	*Ft. In*	*Tons.*					*Tons.*		
170 0	35 3½	11 0	1,150	1,812	10.6	4 24-pdr. hwtzrs	None	*180	......	......
225 0	43.8	13 6	2,100	340	5 to 6	2 15″ S. B........	None	......	......	......
137 0	26 0	9 6	450	340	10.0	None	None	80	......	......
......	......	......	190	......	......	None	None	......	......	......
253 8	46 0	19 6	3,000	1,116	10.0	....	....	†330	23	268
225 0	44 0	18 6	2,900	1,024	9.0	....	....	*240	32	285
205 0	38 0	16 6	1,900	715	10.5	6 IX″ S. B. .... 1 8″ M. L. R. 1 60-pdr. B. L. R.	2 12-pdr. S. B. hwtzrs. 1 3″ B. L. H. 1 Gatling.	*235	20	194
265 9	54 3	24 3	5,170	1,050	9.0	4 IX″ S. B	2 20-pdr. B. L. R..... 6 12-pdr. S. B. hwtzrs.	......	......	......
262 7	51 4	23 0	4.650	950	9.15	18 IX″ S. B	2 20-pdr. B. L. R..... 2 12-pdr. S. B. hwtzrs. 1 Gatling.	......	......	......
264 8½	51 4	23 0	4,700	1,000	9.25	8 IX″ S. B .... 1 60-pdr. B. L. R.	2 3″ B. L. H .... 2 20-pdr. B. L. R. 2 12-pdr. S. B. hwtzr.	......	......	......
175 0	45 0	20 0	2,200	......	......	4 32-pdr. S. B	1 12-pdr. S. B. hwtzr.	......	......	......
189 0	51 6	21 6	3,270	......	......	6 32-pdr. S. B	3 12-pdr. S. B. (light) 1 12-pdr. S. B. (heavy) 1 3″ B. L. H.	......	......	......
126 6	32 8	15 6	830	......	......	None	None	......	......	......
117 7	32 10	14 9	675	......	......	None	None	......	......	......

*Anthracite. †Bituminous.

APPENDIX K.

REPORT SHOWING CONDITION OF WORK ON VESSELS BUILDING OR COMPLETED AT NAVY-YARDS OR UNDER CONTRACT JULY 1, 1890.

NAVY-YARD, NEW YORK, *July 31, 1890.*

SIR: In compliance with the instructions contained in the Bureau's letter of June 27 (No. 5761), I herewith submit a statement of the condition of work on U. S. S. Maine on the 1st of July, 1890.

From about 45 to 50 per cent. of the work on the *Maine* is now completed, but the time and cost of finishing the vessel will depend largely upon the date of receipt of the armor-plates at the yard.

The great importance of the early delivery of the armor [illegible] that plates of the side armor belt must be put in place before th[illegible] deck, from Nos. 24 to 67, together with the main-deck be[illegible] divisional bulk-heads in this space can be erected. The pla[illegible] inclined armored bulk-heads are needed now, and the plates [illegible] be needed in a few weeks.

So far it has not been possible to obtain any information as to the probable time of delivery of these plates, and any estimate on the completion of the ship is only a guess, if the Department can not give the above information.

WORK COMPLETED ON U. S. S. MAINE TO DATE.

Keel-plates: Double keel-plates laid, riveted, and calked.

Vertical keel: With angles, completed, riveted, and calked.

Main frames: From No. 1 to No. 24 are completed to main deck and riveted; from No. 25 to No. 67 are completed to armor berth-deck and riveted; from No. 68 to No. 86 are completed to main-deck, but riveted up to protective-deck and partly riveted to main-deck.

Longitudinals: The first, second, third, and fourth longitudinals are in position, riveted and calked. Intermediate longitudinals (under engine foundation) are completed and riveted.

Intermediate frames: Under engine foundation are completed and riveted.

Stem: Is in position and riveted (up to berth-deck).

Stern-post: Both sections are in position and riveted (up to protective-deck).

Ram-plates: Are in position on stern and riveted.

Shaft-sleeves: Are in position and riveted.

Shaft-hangers: Are in position and riveted.

Bilge-keel: Completed and riveted but not calked.

Outside plating: Strake A completed, riveted, and calked. Strake B, completed, riveted, and calked. Strake C, completed, riveted, and calked. Strake D, completed, riveted and calked. Strake E, completed, riveted, and calked, except two No. 15. Strake F, completed, riveted, and calked. Strake G, completed, riveted, and calked. Strake H, completed, riveted, and calked. Strake J, completed, riveted, and calked. Strake K, completed, riveted, and calked. Strake L, completed, riveted not calked. Strake M, completed, except two each, Nos. 5, 6, and 7 (one-half riveted). Strake N, completed, except two each, Nos. 6, 7, 8, and 9 (not riveted). Strake O, two each of Nos. 1, 2, and 3, are in position (not riveted). Strake PP, two each of Nos. 1, 2 and 3, are in position (not riveted). Strake P, two each of No. 1 are in position (not riveted).

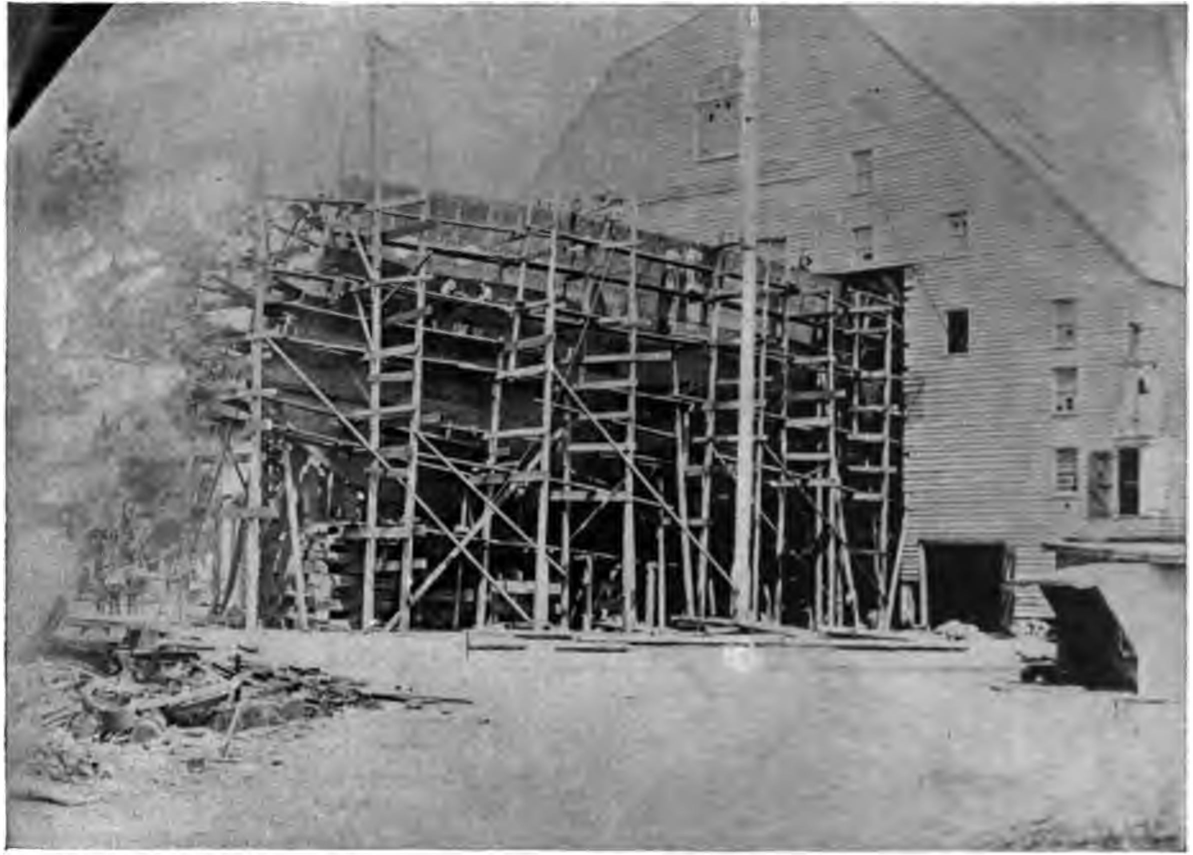
The above completes the outside plating, up to main deck forward, from stem to frame No. 24 midship, to armor berth deck from frames No. 24 to No. 67 aft, to protective deck from frame No. 67 to stern-post.

Inner bottom plating: All completed, riveted, and calked.

Armor backing: Is all completed and riveted (except the angle-bars for wood backing) but not calked.

Deck-beams: Platform-deck beams are all completed, in position and riveted. Protective-deck beams from No. 1 to No. 30 forward, and from No. 72 to No. 86 aft, are completed, in position, and riveted. Armor berth-deck beams are all completed, in position, and riveted. Berth-deck beams from No. 1 to No. 24 forward, and from No. 67 to No. 86 aft are completed, in position, and riveted. Main-deck beams from No. 1 to No. 24 forward, are in position and riveted, and from No. 25 to No. 86 are completed and ready for position.

Hatch carlings: On protective-deck completed and riveted. On armor berth-deck completed and riveted. On berth-deck forward from No. 24, completed and riveted. On main-deck, forward from No. 24, completed and riveted.



U. S. S. Maine, New York, August 28, 1890.

APPENDIX K.

REPORT SHOWING CONDITION OF WORK ON VESSELS BUILDING OR COMPLETED AT NAVY-YARDS OR UNDER CONTRACT JULY 1, 1890.

NAVY-YARD, NEW YORK, *July* 31, 1890.

SIR: In compliance with the instructions contained in the Bureau's letter of June 27 (No. 5761), I herewith submit a statement of the condition of work on U. S. S. *Maine* on the 1st of July, 1890.

From about 45 to 50 per cent. of the work on the *Maine* is now completed, but the time and cost of finishing the vessel will depend largely upon the date of receipt of the armor-plates at the yard.

The great importance of the early delivery of the armor is due to the fact that the plates of the side armor belt must be put in place before the frames above the armor-deck, from Nos. 24 to 67, together with the main deck beams, outside plating, and divisional bulk-heads in this space can be erected. The plates of the transverse and inclined armored bulk-heads are needed now, and the plates of side armor belt will be needed in a few weeks.

So far it has not been possible to obtain any information as to the probable time of delivery of these plates, and any estimate on the completion of the ship is only a guess, if the Department can not give the above information.

WORK COMPLETED ON U. S. S. MAINE TO DATE.

Keel-plates: Double keel-plates laid, riveted, and calked.

Vertical keel: With angles, completed, riveted, and calked.

Main frames: From No. 1 to No. 24 are completed to main deck and riveted; from No. 25 to No. 67 are completed to armor berth-deck and riveted; from No. 68 to No. 86 are completed to main-deck, but riveted up to protective-deck and partly riveted to main-deck.

Longitudinals: The first, second, third, and fourth longitudinals are in position, riveted and calked. Intermediate longitudinals (under engine foundation) are completed and riveted.

Intermediate frames: Under engine foundation are completed and riveted.

Stem: Is in position and riveted (up to berth-deck).

Stern-post: Both sections are in position and riveted (up to protective-deck).

Ram-plates: Are in position on stern and riveted.

Shaft-sleeves: Are in position and riveted.

Shaft-hangers: Are in position and riveted.

Bilge-keel: Completed and riveted but not calked.

Outside plating: Strake A completed, riveted, and calked. Strake B, completed, riveted, and calked. Strake C, completed, riveted, and calked. Strake D, completed, riveted and calked. Strake E, completed, riveted, and calked, except two No. 15. Strake F, completed, riveted, and calked. Strake G, completed, riveted, and calked. Strake H, completed, riveted, and calked. Strake J, completed, riveted, and calked. Strake K, completed, riveted, and calked. Strake L, completed, riveted not calked. Strake M, completed, except two each, Nos. 5, 6, and 7 (one-half riveted). Strake N, completed, except two each, Nos. 6, 7, 8, and 9 (not riveted). Strake O, two each of Nos. 1, 2, and 3, are in position (not riveted). Strake PP, two each of Nos. 1, 2 and 3, are in position (not riveted). Strake P, two each of No. 1 are in position (not riveted).

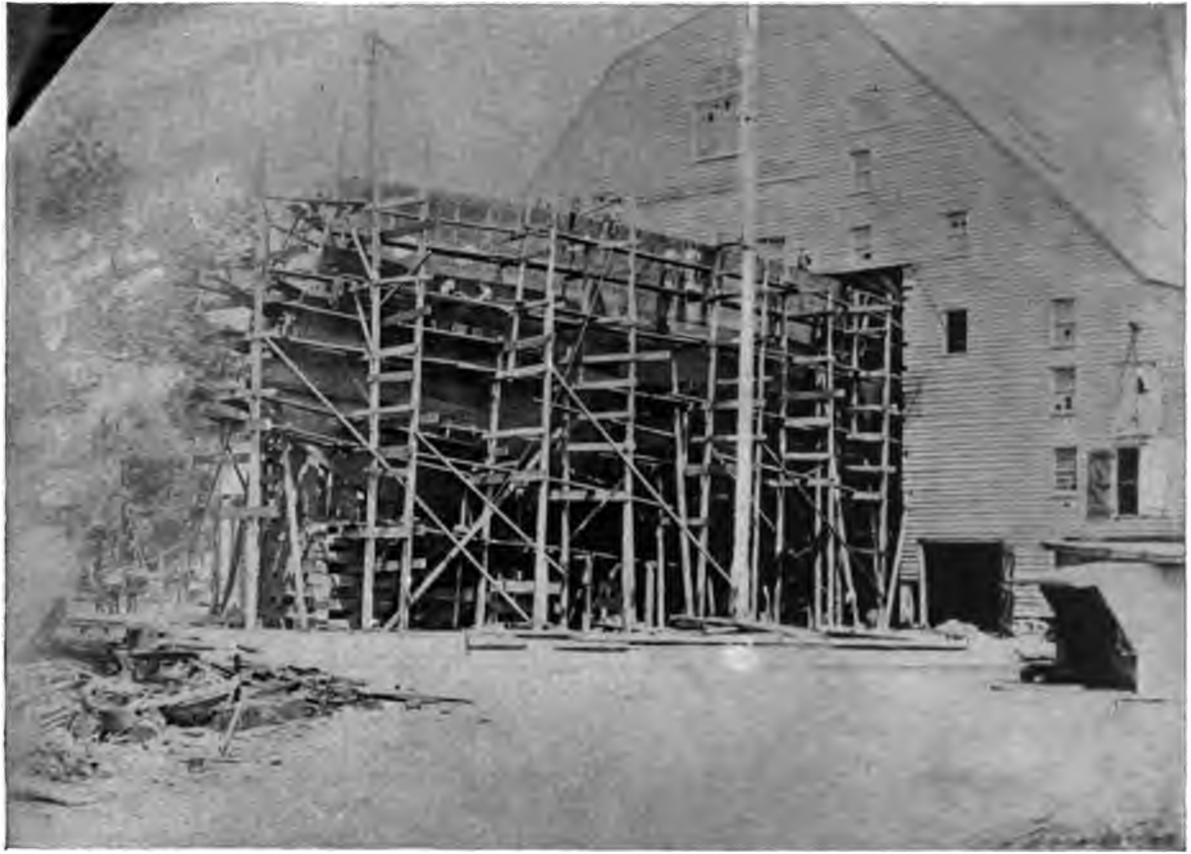
The above completes the outside plating, up to main deck forward, from stem to frame No. 24 midship, to armor berth deck from frames No. 24 to No. 67 aft, to protective deck from frame No. 67 to stern-post.

Inner bottom plating: All completed, riveted, and calked.

Armor backing: Is all completed and riveted (except the angle-bars for wood backing) but not calked.

Deck-beams: Platform-deck beams are all completed, in position and riveted. Protective-deck beams from No. 1 to No. 30 forward, and from No. 72 to No. 86 aft, are completed, in position, and riveted. Armor berth-deck beams are all completed, in position, and riveted. Berth-deck beams from No. 1 to No. 24 forward, and from No. 67 to No. 86 aft are completed, in position, and riveted. Main-deck beams from No. 1 to No. 24 forward, are in position and riveted, and from No. 25 to No. 86 are completed and ready for position.

Hatch carlings: On protective-deck completed and riveted. On armor berth-deck completed and riveted. On berth-deck forward from No. 24, completed and riveted. On main-deck, forward from No. 24, completed and riveted.



U. S. S. MAINE, NEW YORK, AUGUST 28, 1890.

Wing passages: Upper and lower, all completed and partly riveted. The wing passage bulk-heads are completed but not riveted.

Bulk-heads, transverse: On frame No. 6, completed from hold to berth-deck, riveted and calked; on frame No. 9, completed from protective-deck to main-deck, not riveted; on frame No. 12, completed from hold to berth-deck, riveted and calked; on frame No. 16, one-half completed from berth to main-decks, not riveted; on frame No. 18, completed from hold to berth-deck, riveted and calked; on frame No. 24, completed from hold to armor berth-deck, riveted and one-half calked; on frame No. 30, completed from hold to armor berth-deck, riveted and two-thirds calked; on frame No. 41, completed from hold to armor berth-deck, not riveted; on frame No. 52, completed from hold to armor berth-deck, not riveted; on frame No. 58, completed from hold to armor berth-deck, not riveted; on frame No. 67, completed from hold to armor berth-deck, not riveted; on frame No. 73, completed from hold to protective deck, one-half riveted; on frame No. 76, completed from platform to protective deck, not riveted.

Bulk-heads, transverse: On frame No. 77, completed from hold to protective-deck, but riveted only to platform-deck. On frame No. 81, from hold to platform-deck, riveted and calked.

Partial bulk-head: Between frames No. 68 and No. 69, from platform to protective-deck (on both sides), one-half riveted. Between frames No. 70 and No. 71, from platform to protective deck (on both sides), riveted.

Longitudinal: From frames No. 12 to No. 24, completed to protective deck (on both sides), riveted and calked. From frames No. 21 to No. 24, completed to protective deck (on both sides), riveted and calked. From frames No. 21 to No. 24, completed between platform and protective decks (both sides), and riveted. From frames No. 24 to No. 30, completed from platform to protective deck (on port side), riveted and one-half calked. From frames No. 67 to No. 71, completed from platform to protective decks (both sides), riveted. From frames No. 71 to No. 77, completed from platform to protective decks (both sides), not riveted.

Shaft alley bulk-heads: About three-quarters completed (on both sides).

Gun support or prison: Completed (on both sides), not riveted.

Coffer-dam: Staples and angles for forward coffer-dam are completed and riveted.

Water-tanks: All are completed, riveted, and calked.

Coal-bunkers: Are completed on both sides, and one-third riveted.

Armor-shelf: Completed, riveted, and one-third calked.

Decks: Platform-deck completed fore and aft, and riveted forward. Protective-deck, double-plated from stem to frame No. 24, and single plated from No. 24 to No. 30, all riveted, and from frame No. 72 to stern-post double plated, and one-quarter riveted and calked. Berth-deck from stem to frame No. 24 forward, completed and one-third riveted. Armor berth-deck, from frame No. 24 to No. 67, double-plated except (65 plates), one-third riveted. Armor incline deck, lower course completed and riveted. Main-deck, from stem to frame No. 24, completed but not riveted.

Engine foundation: Is four-tenths completed, not riveted.

Thrust bearings: Two-tenths completed.

Boiler saddles: Are under way.

Air-ducts: Are about two-thirds completed in wing passages.

Cementing: Is nine-tenths completed.

Valves: Two sluice-valves 12 inches on starboard side, one at frame No. 18, one at frame No. 67, two-thirds completed. Automatic valves to connect with gutters in the wing passages (24) on each side with pipe connections one-half completed. Sea-valves on frames Nos. 15, 24, and 67, port, and No. 67 starboard, are completed.

Drains: Main drain between inner and outer plating, from frames No. 18 to No. 67 on starboard side, is completed. Secondary drain on port side with valves, strainers, and bilge-pipes, completed. All pipes in connection with hand-pumps and for flushing magazines, shell rooms, and connections for sea-valves and drainage, are under way as far as practicable.

Man-hole covers: With frames and fastenings completed and riveted in upper wing passages, and in position in lower wing passages, except two on port and three on starboard, but not riveted.

Stanchions: In hold are all in position and riveted, except those in engine and boiler rooms. On platform-deck all completed and riveted. On protective-deck, completed between frames No. 24 and No. 30 and riveted.

The following is a list of rooms and apartments which are plated:

In hold: General stores; fixed ammunition. Forward: Torpedo room; shell room; ordnance stores; magazine. Aft: Fixed ammunition; store-rooms.

Blocks: One-tenth completed; work suspended to complete other orders.

Furniture and outfits: Not commenced.

Platform deck: Torpedo rooms; handling room. Forward: General store-room; magazine; paymaster's store-room; stores. Aft: Electric plant; paymaster's clothing; paymaster's stores; steering room.

Protective deck—Forward: Construction stores; passing room.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy

COMMANDANT NAVY-YARD, NEW YORK.

NAVY-YARD, NEW YORK, *July* 11, 1890.

SIR: In compliance with the instructions contained in the Bureau's letter of 27th, I herewith submit a statement of the condition of work on the 1st of July, 1890, on

CRUISER No. 7.

Outer flat keel-plate: Complete, except one plate aft.

Inner flat keel-plate: Complete, except two plates aft.

Vertical keel-plate: Complete from frame 15 to frame 75.

Stem: Lower piece in place, and being fitted to vertical and flat keel-plates. Upper piece machined and ready to go in place.

Transverse frames: Frames below margin-plate and forward of double bottom 22, 24, and frames 25 to 67, including additional frames in engine space complete and in place. Frames between margin-plate and protective-deck 25, 27, 28, 29, 30, 32, 33, 34, 35, 36, 38, 39, 40, 42, 43, 45, 46, and 67, in place.

Flat keelson-plates: From frame 26 to frame 31, complete.

First longitudinal: Port, from frame 25 to frame 64. Angles, port, from frame 25 to frame 50. Starboard, from frame 25 to frame 44. Starboard, from frame 48 to frame 64. Angles, starboard, from frame 25 to frame 43.

Second longitudinal: Port and starboard, from frame 25 to frame 62. Angles, starboard, from frame 25 to frame 62.

Outside plating: Port side: B strake from frame 27 to frame 62; C strake from frame 35 to frame 50; D strake from frame 28 to frame 64; E strake from frame 36 to frame 51; F strake from frame 34 to frame 54. Starboard side: B strake from frame 27 to frame 63; C strake from frame 35 to frame 40; D strake from frame 28 to frame 64; E strake from frame 36 to frame 46; F strake from frame 34 to frame 54.

Inner bottom plating: Port side: Strake I B from frame 26 to frame 49; strake I D from frame 26 to frame 46; strake I F from frame 31 to frame 46. Margin plate: Strake I G from frame 26 to frame 60. Starboard side: Strake I B from frame 26 to frame 44; Strake I D from frame 20 to frame 50; Strake I F from frame 31 to frame 46.

Riveting: Vertical keel butt-straps and angles from frame 17 to frame 66. Inner and outer keel-plates and B strake riveted from frame 29 to frame 62 (edges and butts). Clips for transverse frames, from frame 20 to frame 65.

First longitudinal port and starboard: Top angle and butt-straps and frame clips riveted from frame 25 to 50, and from frame 59 to 67.

Second longitudinal port and starboard: Top angles and butt-straps riveted, from frame 35 to frame 54. Frame-clips riveted from frame 25 to frame 62.

Margin plate: Angle on outer edge riveted from frame 26 to 56 port and starboard.

Outside plating: Port side: B, C, D strakes riveted from frame 36 to frame 45: E strake riveted from frame 38 to frame 46. Starboard side: B, C, and D strakes riveted from frame 36 to 40; E and F strakes riveted from frame 37 to 41. Straps have been fitted to A, B, C, D, E, and F strakes outside plating and I G. (Margin plate.) Staple angles have been riveted for girder A in wake of engine from frame 49 to 56. All floor-plates have been riveted to the frames and reverse frames and water-tight frames have been riveted and calked. Extra girders for boiler saddles have been fitted and riveted up. Frames between margin-plate and protective-deck from 46 to 66 are bent and punched, but not yet in place.

Protective-deck beams: 20, 21, 30, 31, 38, 45, and 64 are bent, and all holes drilled, but not yet in place.

I estimate that 8 per cent. of the work on this vessel is completed.

Very respectfully, your obedient servant,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD, *New York.*

NAVY-YARD, NEW YORK, *July* 12, 1890.

SIR: In compliance with the instructions contained in the Bureau's letter of June 27, I herewith submit a statement of the condition of work on the

U. S. S. MIANTONOMOH.

Hull, including ventilation and drainage system: Complete.

Armor of both turrets: In place, and bolted up; alterations being made to turret-ports, and interior of turrets being finished up.

If there is no delay in the placing of the gun-carriages and guns, the work on this vessel can be completed in about three months' time.

Conning-tower and plating on top of turrets being fitted up on dock.

Hatches, in wake of fire of guns, being cut down and hinged so as to be turned down upon deck when clearing ship for action.

SUMMARY.

Work on hull proper, fittings, and furniture.—Ninety-nine per cent. completed.

Furniture: Eight-tenths completed.

Twenty-five days to complete boats.

First cutter: Eight-tenths completed.

Second cutter and dinghy: To be built.

Working-launch, third cutter, gig, and steam-launch: Are to be repaired.

Work on turrets: Ninety per cent. finished.

The work has been suspended on account of other orders. Eight weeks' time required to complete all the boats..

Very respectfully, your obedient servant,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD, NEW YORK.

NAVY-YARD, NEW YORK, *July* 12, 1890.

SIR: In compliance with the Bureau's instructions of June 27, I herewith submit a a statement of the condition of work on

U. S. S. TERROR.

Hull: Nine-tenths completed, with the exception of turrets, side-armor, and decks.

Ventilation system: One-third completed.

Drainage system: One-half completed.

Framing of forward turret: Has been completed and set up in shop, and has been taken down, and is being set up on dock.

Framing of after turret: Two-thirds complete in shop; waiting for material.

Roller carriage frames and rollers: Complete and ready to be set up for both turrets.

Upper and lower roller-paths for forward turret: Three-fourths finished.

Pneumatic steering gear: Is on board, but not in place (to be fitted by Pneumatic Power Company).

The wood backing behind armor has been received, and if the armor were here the work of putting the plates in place could be begun.

Templates for the armor were made last winter, but this office was informed that the contractors, the Bethlehem Iron Company, were not yet ready to roll the plates. No information has since been received in regard to this matter.

Considering the final completion of the vessel ready for sea, I estimate that 60 per cent. of the work is complete, but the time will depend upon the delivery of the armor.

Furniture: A portion taken for the U. S. S. *Philadelphia*, which will take sixty days to complete.

Boats: First cutter, second cutter, and dinghy are completed; sailing launch three-tenths completed (one boat was given to U. S. S. *Philadelphia*); twelve weeks' time is required to complete all the boats.

Boat spars: One-half completed; ninety days to complete.

Very respectfully, your obedient servant,

W. L. MINTONYE.

COMMANDANT NAVY-YARD, *New York.*

NAVY YARD, NEW YORK, *August* 9, 1890.

SIR: In compliance with the instructions contained in the Bureau's letter of June 27, 1890 (No. 5761), I herewith submit a statement as to the estimated time required for the completion of the masts, spars, boats, furniture, etc., for the new ships from July 1, 1890:

U. S. S. PHILADELPHIA.

Blocks: Nine-tenths completed; about twenty-five days to complete.
Furniture: Nearly completed; thirty-four days to complete and polish.
Boats: Masts all complete.
Stores and outfit: All complete.

U. S. S. NEWARK.

Boats: Steam whale-boat, five-tenths completed; sailing launch, three-tenths completed; sixteen weeks are required for the completion of all the boats.
Masts: Nine-tenths completed; forty days to complete.
Spars: Seven-tenths completed; ninety days to complete.
Boat spars: One-tenth completed; ninety days to complete.

Statement of furniture, spars, boats, etc., for U. S. S. *Terror*, *Puritan*, *Miantonomoh*, and *Maine* embodied in special reports of those vessels.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY YARD, *New York.*

NAVY YARD, NEW YORK, *July* 31, 1890.

SIR: In compliance with the instructions contained in the Bureau's letter of June 27 (No. 5761), I herewith submit a statement of the work on vessels under repair on the 1st of July, 1890:

U. S. S. *Dolphin*, completed.
U. S. S. *Essex*, completed.
U. S. S. *Kearsarge*, completed.
U. S. S. *Vermont*, completed.
U. S. S. *Nantucket*, completed.
U. S. S. *Yantic*, completed.
U. S. S. *Alarm*, five-tenths completed. Estimated time to finish, five weeks.
U. S. S. *Enterprise*, nine-tenths completed. Estimated time to finish, five weeks.
U. S. S. *Minnesota*, one-tenth completed. Waiting for material.
U. S. S. *Pensacola*, five-tenths completed. Estimated time to finish, five weeks.
U. S. S. *Yorktown*, one-tenth completed. Estimated time to finish, two months, depending upon the time a new quadrant can be furnished.
U. S. S. *Catalpa*, seven-tenths completed. Estimated time to finish, two weeks.
U. S. tug *Triana*, two-tenths completed. Estimated time to finish, four weeks.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY YARD, *New York.*

NAVAL CONSTRUCTOR'S OFFICE,
NAVY-YARD, MARE ISLAND, CAL., *August* 4, 1890.

SIR: In compliance with the order of Bureau of Construction and Repair, dated 27th June, 1890, I report the "actual condition of work on the monitor

MONADNOCK

on July 1, 1890," as follows:

Hold: The work of removing bulkheads, etc., preparatory to putting up new work, as per printed specifications, is about one-half completed. The fore and aft bulkheads in shaft alleys have been regulated, straightened, and secured. All bulkheads under the after turret have been removed, and a considerable portion of the rivet holes through the ceiling have been plugged. The coal-bunkers between the engine and boiler rooms have been taken down.

Berth deck: In conformity with the plans and specifications, every other deck beam, aft, has been taken out, likewise stringer-plates, stanchions, and hatch-framings, and this part of the vessel is now ready for the erection of new work.

Upper deck: The after turret beams have been cut, and are ready for removal. About twenty plates of the upper course of the armored deck have been taken up in order to rearange the shift of the butts that have become necessary through the change in the original plans, which necessitates cutting new holes for smoke-stacks, ventilators, hatchways, and a diminished diameter of the turrets.

The foregoing is a summary of the work thus far done, and which has been confined exclusively to the after part of the vessel.

To give a correct estimate of the percentage of work completed, based on a final completion of the vessel, is very difficult at this stage of the work, for the reason that much of the work has to be taken down and reconstructed, in addition to which, judging from appearances, much time and expense will be required to make the work in connection with the water-tight compartments already in the vessel perfectly water-tight.

It is estimated that to place the vessel in condition to prosecute the work, including making good all defects, will require about four months; from the expiration of which the actual work of reconstruction may be dated. The percentage of work completed, based on the final completion of the vessel and outfit ready for sea, is estimated at 30 per cent.

In this connection I would respectfully refer to my letter of September 4, 1886, hereunto appended, as showing the condition of the vessel when work was commenced.

Very respectfully,

J. FEASTER,
Naval Constructor, U. S. Navy.

Rear-Admiral A. E. K. BENHAM, U. S. Navy,
Commandant Navy Yard, Mare Island, Cal.

COMMANDANT'S OFFICE,
Navy Yard, Mare Island, Cal., August 7, 1890.

Forwarded to the Chief Constructor, U. S. Navy.

A. E. K. BENHAM,
Commandant.

NAVAL CONSTRUCTOR'S OFFICE,
Navy Yard, Mare Island, Cal., September 4, 1886.

SIR: In compliance with the Bureau's order of August 17, 1886, requiring a report to be made showing the exact condition of work on the double-turreted monitor

MONADNOCK

as she now is, and stating what materials, if any, are on hand belonging to her and intended to be used in her completion, I have the honor to state that I have carefully examined the vessel and would respectfully report as follows:

Hull: The outside of the hull appears to be completed, and shelf ready to receive the wooden backing and armor plates.

Upper deck: The plates on the upper deck are laid, secured, and calked ready for the wooden deck, with the exception of the space over the boilers and the sides where the armor is to be placed. All the hatches and other openings through the deck plating are cut, and the battle-plates fitted to the former. The deck-lights are in and fitted with iron gratings on top. The coal-scuttles are cut, and fitted with their battle-plates.

Bitts: The cable and mooring bitts, also the chocks, are fitted and secured.

Hold: The inner skin or plating is in place, secured and calked; manholes are cut and fitted with covers athwartships and fore and aft. Bulkheads are up, secured and calked. The shaft alleys are built, and the after pieces of shaft are in place with the propellers shipped and secured. The rudder is shipped and fitted with a temporary tiller. The coal bunkers and the turret bulkheads are up, secured and calked. The berth-deck beams are in, fore and aft, and secured with stringers on the sides, also secured and ready to receive the wooden decking. The stanchions are up and secured. The hooks for strengthening the ram and the capstan bed are in place and secured. The flood cocks for magazine and other purposes are in place and secured ready for making the connections. The wing-passage bulkheads between decks are in place and secured.

Material for completion: The following materials, belonging to the vessel and intended to be used in her completion, is on hand at this navy yard: Fourteen plates ⅝-inch iron for boiler beds, weighing 15,120 pounds; sixty plates ⅞-inch iron for deck purposes, weighing 126,000 pounds, which will probably be sufficient to complete the iron deck. One lot ⅞-inch iron rivets, weighing 53,000 pounds. Total weight of material on hand is 194,120 pounds.

Very respectfully, your obedient servant,

JOSEPH FEASTER,
Assistant Naval Constructor, U. S. Navy.

Commodore GEORGE E. BELKNAP, U. S. Navy,
Commandant Navy Yard, Mare Island, Cal.

COMMANDANT'S OFFICE,
Navy Yard, Mare Island, Cal., August 7, 1890.

Forwarded to the constructor, U. S. Navy.

A. E. K. BENHAM,
Commandant.

OFFICE OF NAVAL CONSTRUCTOR FOR U. S. NAVY,
UNION IRON WORKS,
San Francisco, July 10, 1890.

SIR: In compliance with the Bureau's order of the 25th ultimo, I respectfully submit the following report as to the condition of work on the 1st instant on the hull of cruiser No. 5:

SAN FRANCISCO.

Ship requires docking, cleaning, and painting.
All decks require recalking and planing.
Painting of entire hull, including water bottom, in some places with one coat, and in other places two and three coats.
Decks will not be recalked nor much of the painting be done before the official trial.
Authorized changes in pilot house, steering gear, etc., will require three weeks to complete, and that in engine-room hatches about the same length of time.
Gun circles: Eight not yet delivered, to be secured.
Mess lockers: To be fitted in place.
Air-port gaskets: To be overhauled.
Sounding pipes under engines: To be finished.
Additional authorized fittings for sheet and stream anchors: Will require two weeks to complete.
Deck sockets for various valve and water-tight door rods: To be marked, and wrenches for same to stow.
Wire screens: To be fitted in air registers to ammunition-room light boxes, and mouth pieces to air ducts on after platform to fit.
Hammock hooks: Several to put in torpedo chamber.
Guard rails: To berth-deck hatches to make and secure.
Engineers' log room: To be completed.
Bottle racks and hardware: To be fitted in sick bay and dispensary.
Marines' helmet lockers: To be secured.
Upper forward bridge and running-light boxes: To be completed.
Drip pans and filling pipe for sperm oil: To be made.
Masts: To be stepped.
A few portable articles to be stowed.
There will be required various small eyebolts, etc., as the work of final completion progresses.
Pig iron: To be removed and damage done to bulkheads, shelving, etc., in storerooms made good.

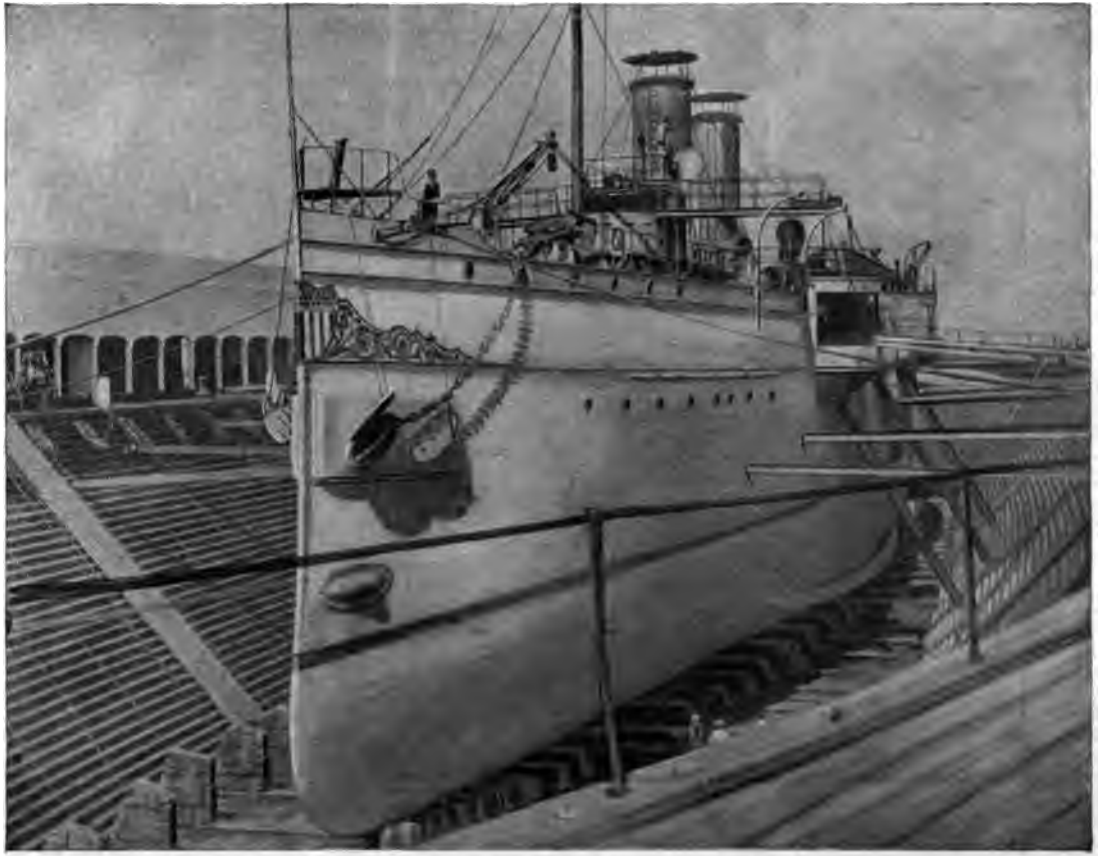
I estimate the work on hull to be 98 per cent. completed, as far as required by the contract.

As to the probable date on which the *San Francisco* will be completed ready for delivery to the Government, I can only say that so far as the hull is concerned it will be thirty working days after her return from a successful steam trial.

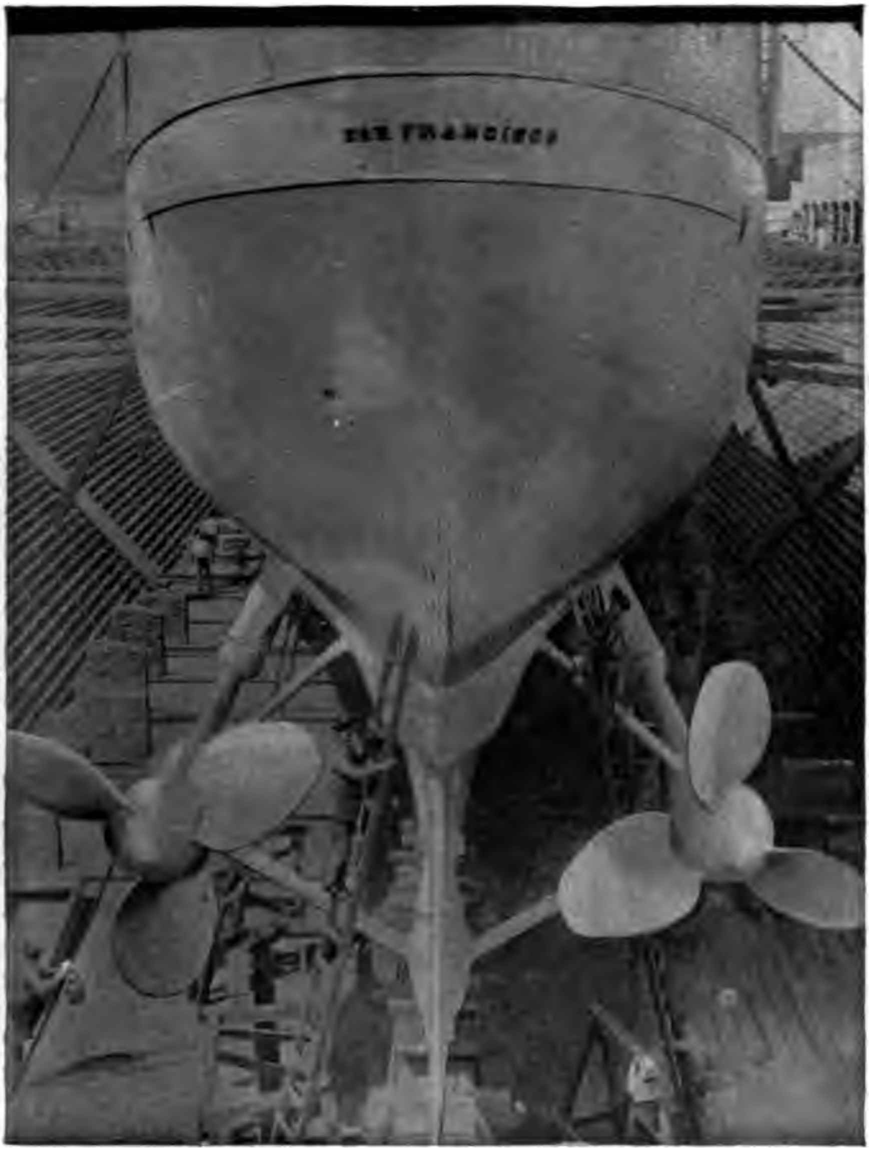
Very respectfully, your obedient servant,

F. L. FERNALD,
Naval Constructor, U. S. Navy, Superintending Hull.

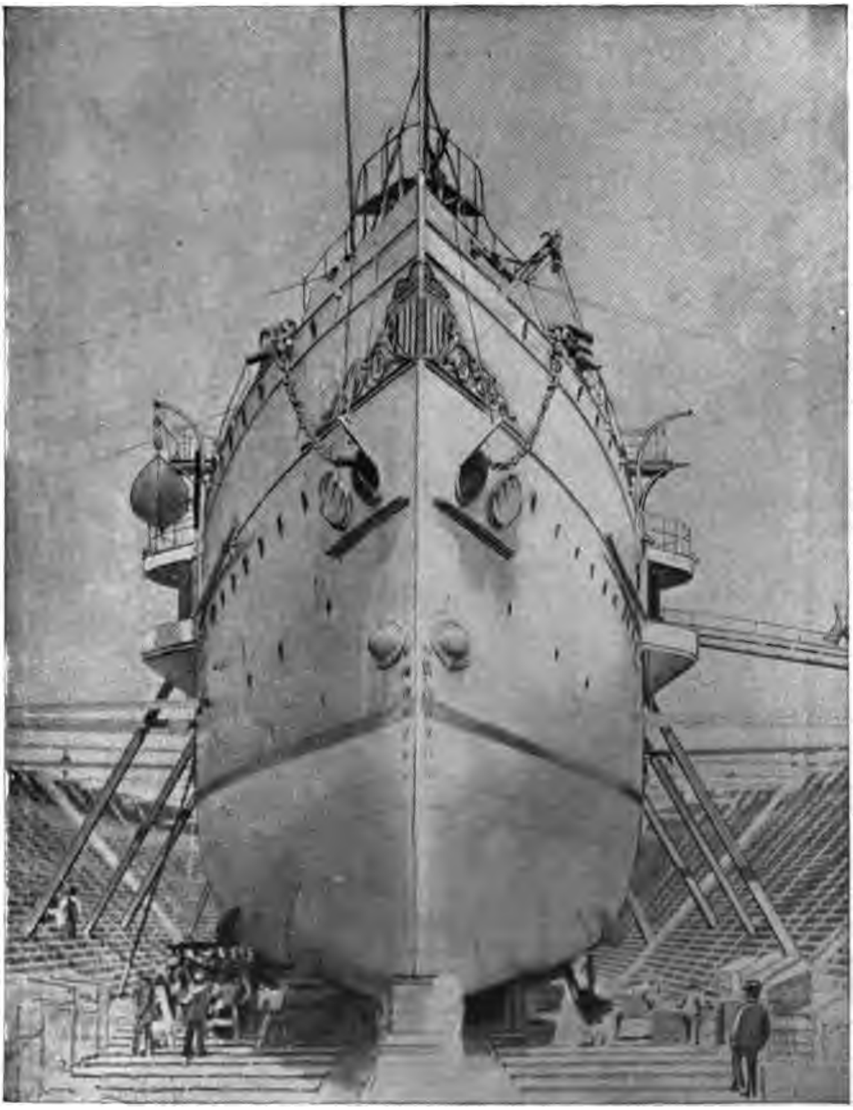
Chief Constructor T. D. WILSON, U. S. Navy,
Chief of Bureau of Construction and Repair.



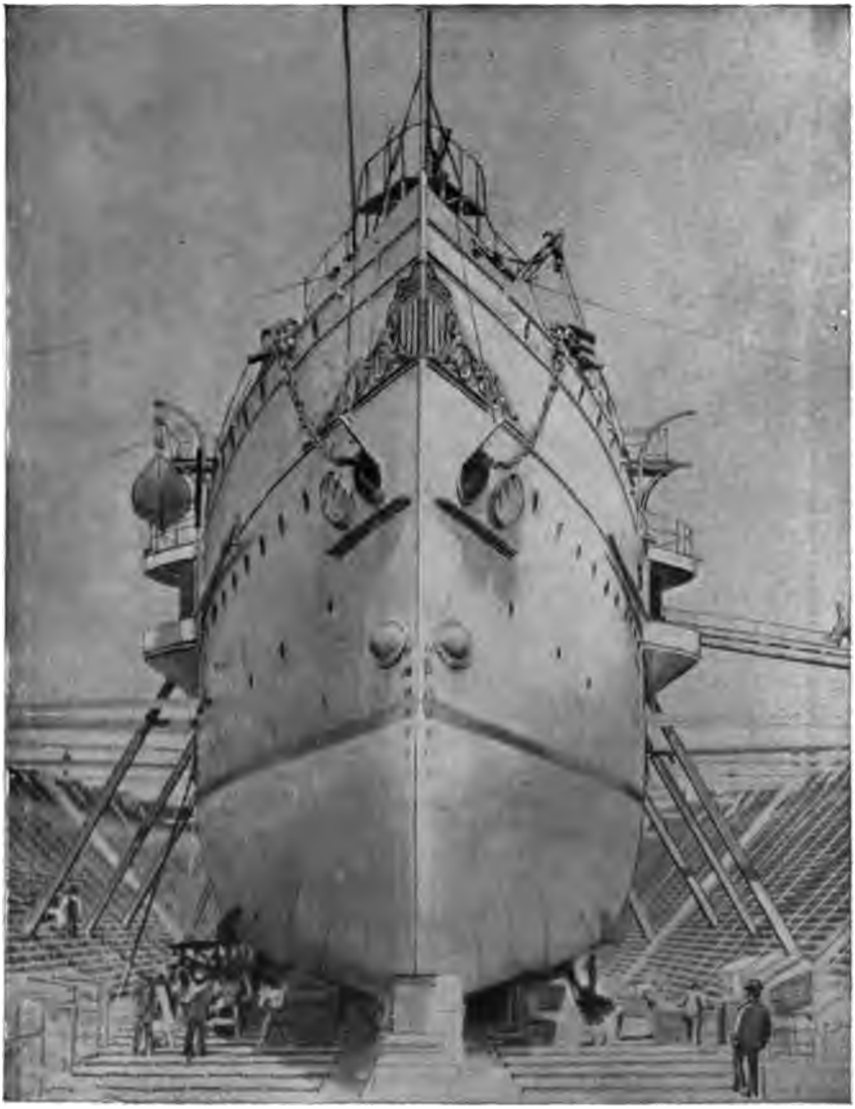
U. S. S. SAN FRANCISCO IN DRY DOCK, AUGUST, 1890.



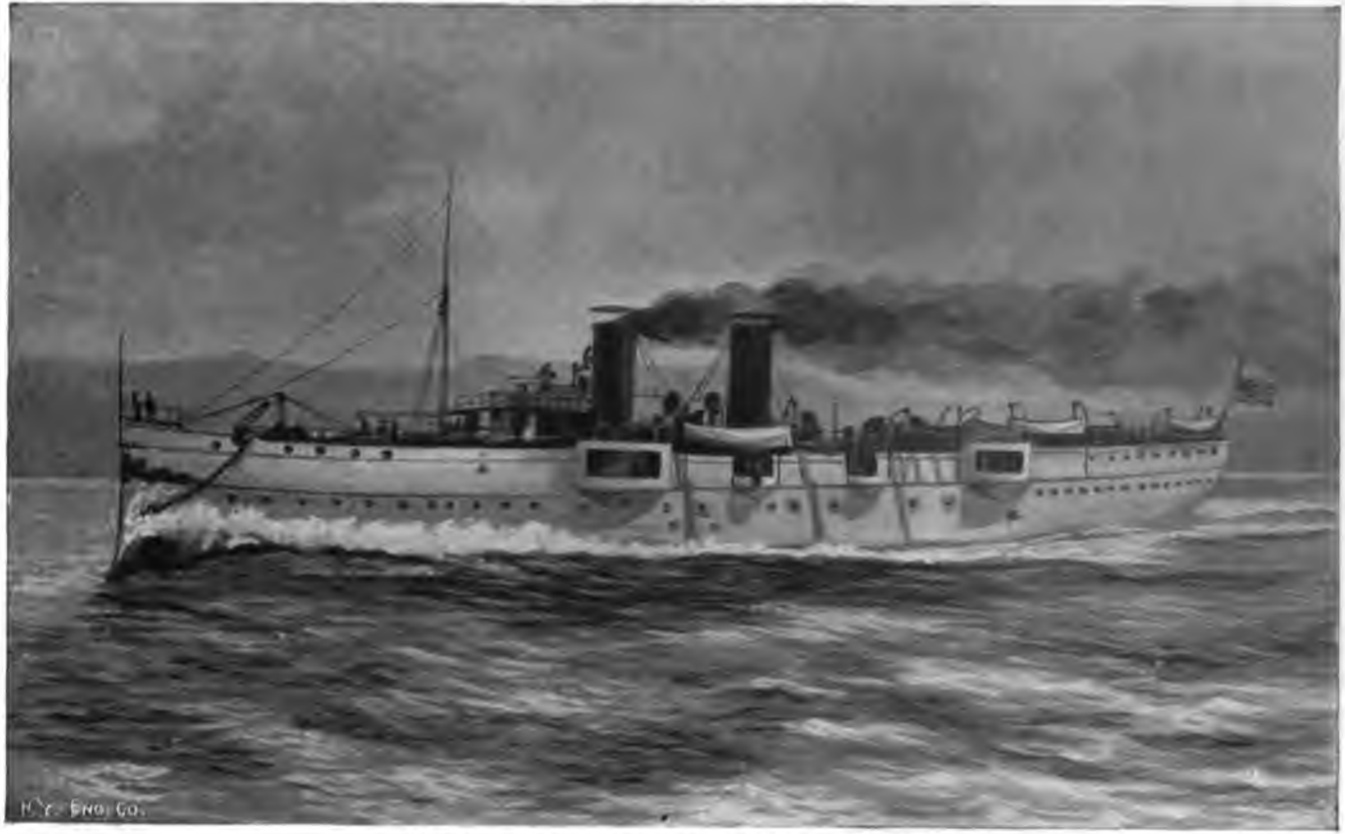
U. S. S. SAN FRANCISCO, AUGUST, 1890.



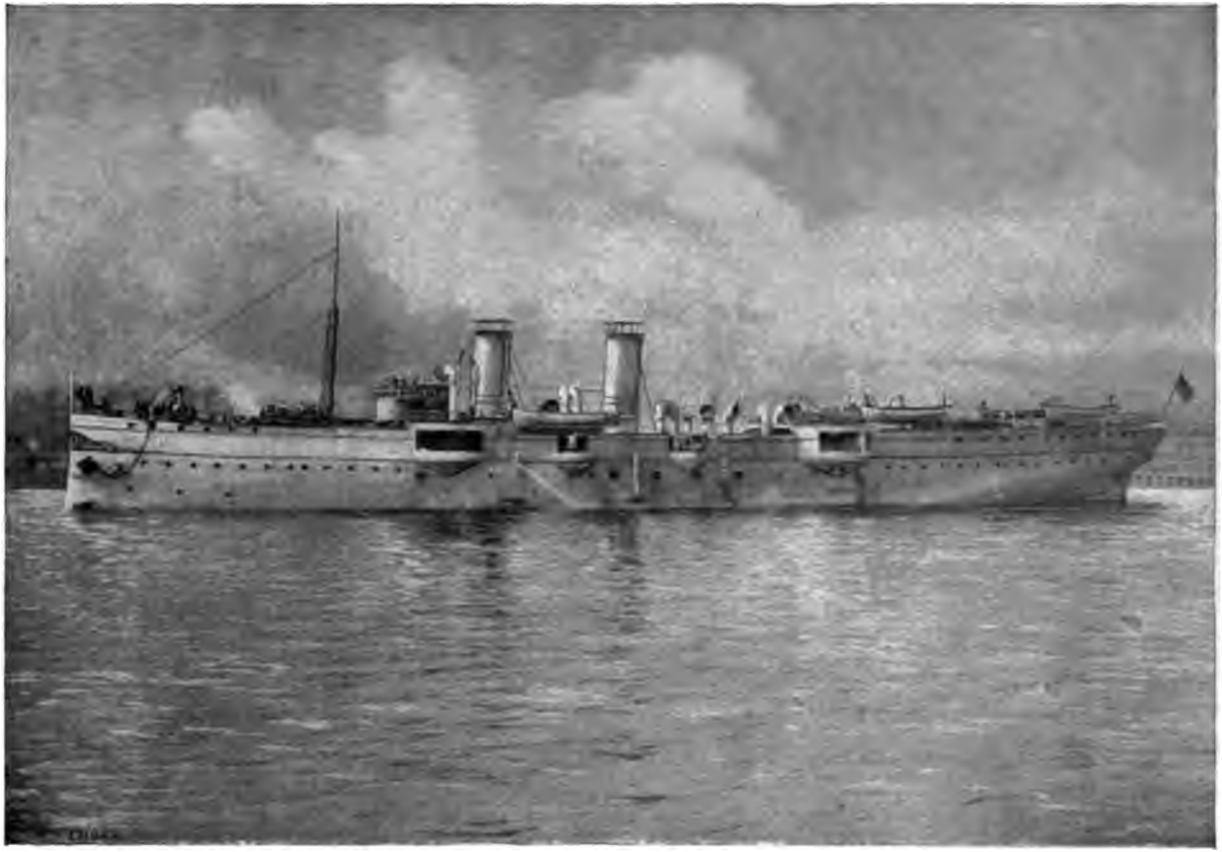
U. S. S. San Francisco in Dry Dock, August, 1890.



U. S. S. SAN FRANCISCO IN DRY DOCK, AUGUST, 1890.



U. S. S. San Francisco on Trial Trip, August, 1890.



U. S. S. SAN FRANCISCO, SEPTEMBER, 1890.

OFFICE OF NAVAL CONSTRUCTOR FOR U. S. NAVY,
UNION IRON WORKS,
San Francisco, July 9, 1890.

SIR: In obedience to the Bureau's order of the 25th ultimo, I respectfully submit the following statement as to the condition of work, on the 1st instant, on the hull of the armored coast-defense vessel

MONTEREY.

ON STOCKS.

Vertical and flat keels, armor shelf, stem, sternpost, rudder, transverse and longitudinal framing (except about one-third of longitudinal back of armor), main-deck beams, half-beams and carlings, after berth-deck beams, main engine seating and flat keelson plate, armor shelf, and backing plates and their angles entirely completed.
Shaft struts: In place ready for fastening.
One hundred and eighty-seven outer plates of three hundred and eighteen required are fitted.
Inner bottom is completed, except a few plates in vicinity of shaft tubes.
Breast hooks: Nearly completed.
Transverse bulkheads Nos. 3 and 77 are in place and partly riveted.
Lower connecting angles for all bulkheads are riveted to inner bottom; and vertical stiffening angles to nearly all bulkheads are in place.
Thirteen plates of lower course of deck armor: In place.
Manhole frames and covers in longitudinals are completed.
Drainage in water bottom is two-thirds finished.
The riveting of all work is well advanced.

IN SHOPS.

Air ports for superstructure; flush hatch frames for berth deck; vertical sliding doors; man hole frames and covers for water bottom and water tanks; deck lights and coal scuttles, and battle plates for same; hand pumps; balance of berth-deck beams; and drainage valves and pipes are all ready to go on board.
One ram plate: Nearly ready.
The hydraulic steering gear is completed ready for erection, with the exception of main and auxiliary crossheads and piping.
A large number of staples and half-staple angles for various purposes are finished.
Several armor, bottom, and bulk head plates are ready to go on board.

I estimate that, so far as labor is concerned, the hull is 25 per cent. completed.

Nearly all the material required for the hull is in the yard.

Owing to the fact that the completion of the *Monterey* depends upon the delivery of the armor, which is to be supplied by the Government, and the finishing of the machinery, it is impossible for me to say when she can be delivered. However, should there be no delay in the delivery of the armor, the hull can, in my opinion, be made ready for the steam trial on the 1st of October, 1891. Should the machinery be completed and the trial prove successful, the vessel can be delivered by the 1st of December following.

Very respectfully, your obedient servant,

F. L. FERNALD,
Naval Constructor, U. S. Navy, Superintending Hull.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief of Bureau of Construction and Repair.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-Yard, Mare Island, Cal., July 25, 1890.

SIR: In compliance with the order of the Bureau of Construction and Repair of 17th instant, No. 6453, I respectfully inform you the following work is yet to be done to complete repairs on the vessels named therein.

U. S. S. ALERT.

Is ready to be taken out of the dock, after which the furniture is to be placed on board and secured. Canvas coating around bowsprit; chain on outside of forecastle to repair; boat grips to leather and put in place; room for gun cotton to finish; change in lead of flood-cocks to be made; flood-cock connections to finish; torpedo booms to iron and put in place; pivot port shutters to be repaired; eye-bolts for preventer rudder chains to put in; coaming for forecastle deck ventilator to put in place; berth to remove; issuing-room to refit; deck and side ladders to put in place; outside, from water-line up, to paint; battens, from poop to forecastle-deck, to paint; spars to paint; steam-cutter, slight repairs to steering gear; sailing launch, slight repairs to stanchions, flag-staff awnings, oars and spars, and recopper and paint.

All other work is about completed.

Estimated time required to complete above is two weeks.

U. S. S. INDEPENDENCE.

Removing the weather-boarding amidship on both sides of the vessel and replacing same with new; repairs to port sashes.

The piercing, dressing off, and calking spar-deck are completed, and should no unexpected defects appear in the planking, work on this vessel can be completed in about four weeks.

Very respectfully,

J. FEASTER,
Naval Constructor, U. S. Navy.

Rear-Admiral A. E. K. BENHAM, U. S. Navy,
Commandant, Navy-Yard, Mare Island, Cal.

COMMANDANT'S OFFICE,
Navy-Yard, Mare Island, Cal., July 26, 1890.

Forwarded to the Bureau for its information.

A. E. K. BENHAM,
Commandant.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-Yard, Portsmouth, N. H., July 8, 1890.

SIR: In compliance with the Bureau's letter No. 4765, of June 27, ultimo, "to furnish a tabulated statement of vessels under repairs July 1, 1890, with percentage of work to complete them in all details under cognizance of the Bureau of Construction and Repair, with estimated time," I have to report as follows:

LANCASTER.

Hull, spars: Fifty per cent. to complete.
Boats: Ninety per cent. to complete.
Blocks, furniture: Sixty per cent. to complete.
Stores and outfit: Forty per cent. to complete.

Estimated time for above, four months.

Also to report the date upon which all masts, spars, boats, furniture, etc., ordered made for new vessels will be completed, I have to report as follows:

CONCORD.

Spars: Completed.
Boats: Completed.

The remainder will be completed in six weeks from July 1, instant.

BENNINGTON.

Spars: Completed.

The remainder will be completed in three months from July 1, instant.

Very respectfully,

JOHN B. HOOVER,
Naval Constructor, U. S. Navy.

The COMMANDANT.

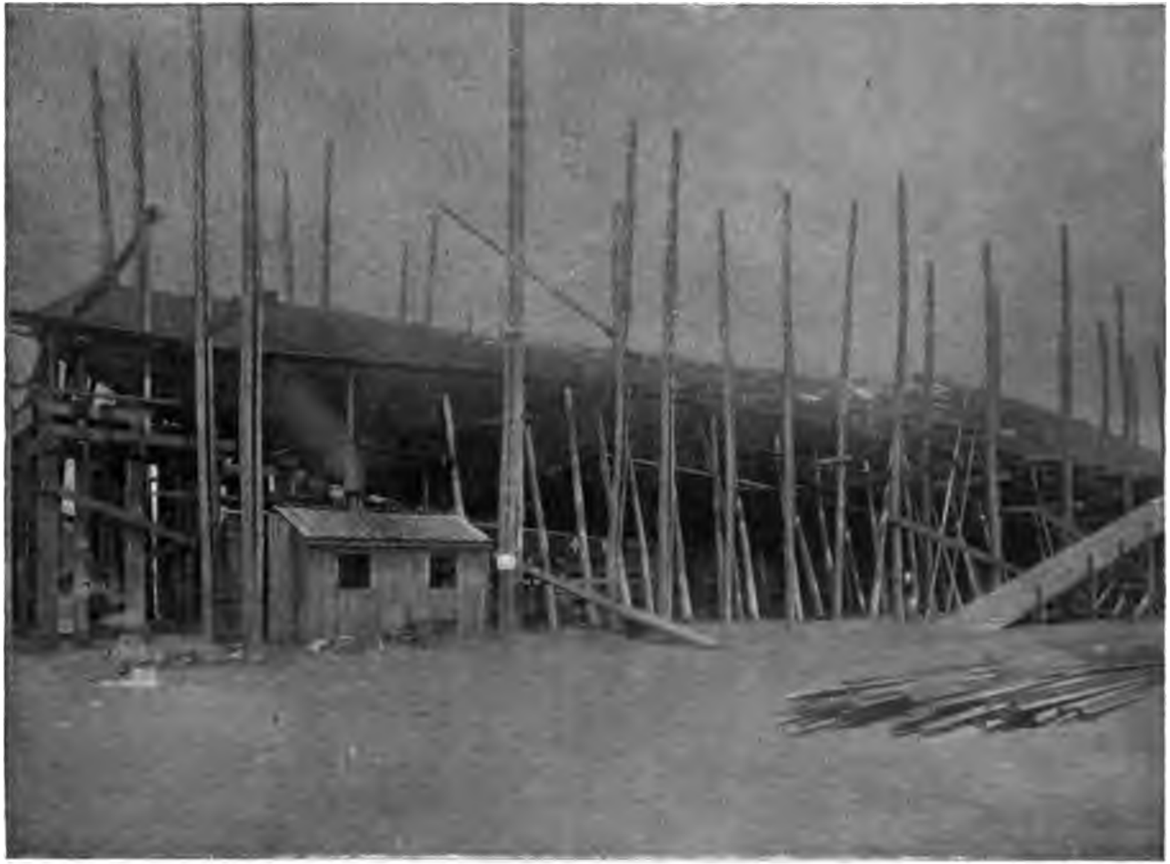
NAVAL CONSTRUCTOR'S OFFICE,
U. S. Navy-Yard, Norfolk, Va., July 8, 1890.

SIR: In compliance with the order of the Bureau of Construction and Repair, No. 5760, of the 27th ultimo, I have the honor to report the actual condition of the work at this navy-yard on July 1, 1890.

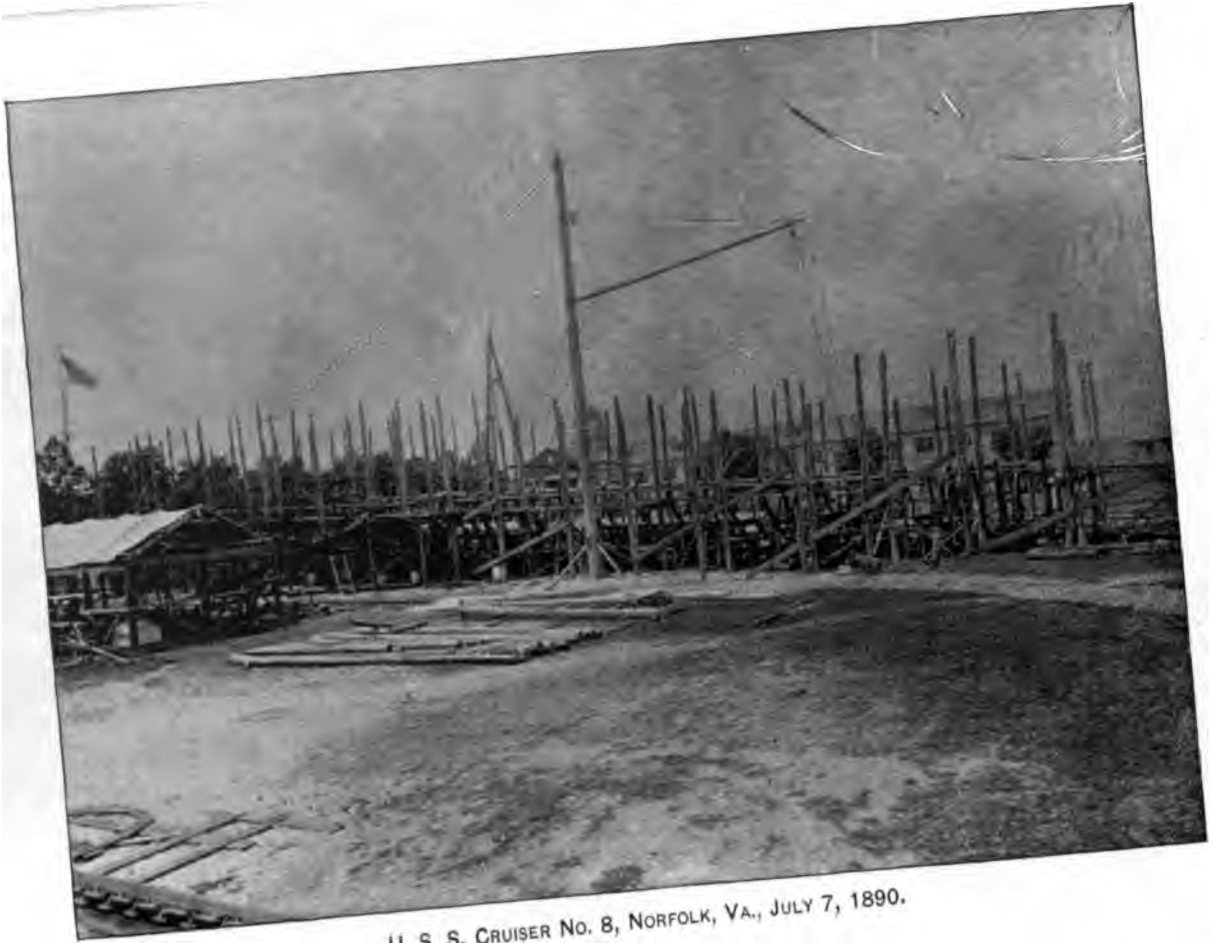
TEXAS.

Three photographs of the *Texas*, taken on July 7, 1890, are herewith submitted.

Keel: Completed, except fitting the two after flat keel-plates to the stern-post.
Stern: Lower part completed and erected; upper part ready for erection.



U. S. ARMORED BATTLE SHIP TEXAS, NORFOLK, VA., JULY 7, 1890.



U. S. S. CRUISER NO. 8, NORFOLK, VA., JULY 7, 1890.

eral miscellaneous material is on hand. Material for backing of side armor is not yet delivered, and work has been long delayed on that account.

Removal of material: All the old turret gear has been removed and all bulk-heads, beams, and other framing of which the new plans require the removal are eight-tenths cut out, and the ship is ready to begin fitting the new work as soon as material arrives.
Deck lights: Preparing to cut new holes in upper deck, and making patterns for brass castings.
Berth-deck scuttles: Castings begun.
Coal scuttles: Patterns begun.
Ward-room and other joiner work: White pine moldings half complete.
Life-line stanchions: Forgings one-third complete.
Hawse-pipes, towing, and mooring bitts: On hand, not fitted.
Warping-chocks: On hand, but not fitted.
Boat derricks: Preparing detail plans.
Steering apparatus: Steam steerer required.
Portable furniture: Not begun.

There are no vessels at this station under repairs, and no orders are on hand for masts, spars, boats, or other outfits for new vessels.

Very respectfully,

FRANCIS T. BOWLES.
Naval Constructor, U. S. Navy.

Commodore A. W. WEAVER, U. S. Navy,
Commandant.

Respectfully forwarded for the information of chief of Bureau of Construction and Repair.

GEO. W. WOOD,
Commander, Commanding.

OFFICE OF SUPERINTENDING CONSTRUCTOR FOR U. S. NAVY,
BATH IRON WORKS,
Bath, Me., July 5, 1890.

SIR: I have to make the following report in relation to

GUN-BOATS 5 AND 6.

A requisition has been made for the main and reversed frames (to water-tight deck), floor-plates, flat keels (inner and outer), vertical keel, flat keelson, water-tight deck-beams, gussets to water-tight deck-beams, and an order for the rivets; all to be in the yard in from ten days to three weeks. All deck-plank bought in Bath. Commenced to lay ships down.

Very respectfully, your obedient servant,

JOHN B. HOOVER,
Naval Constructor, U. S. Navy.

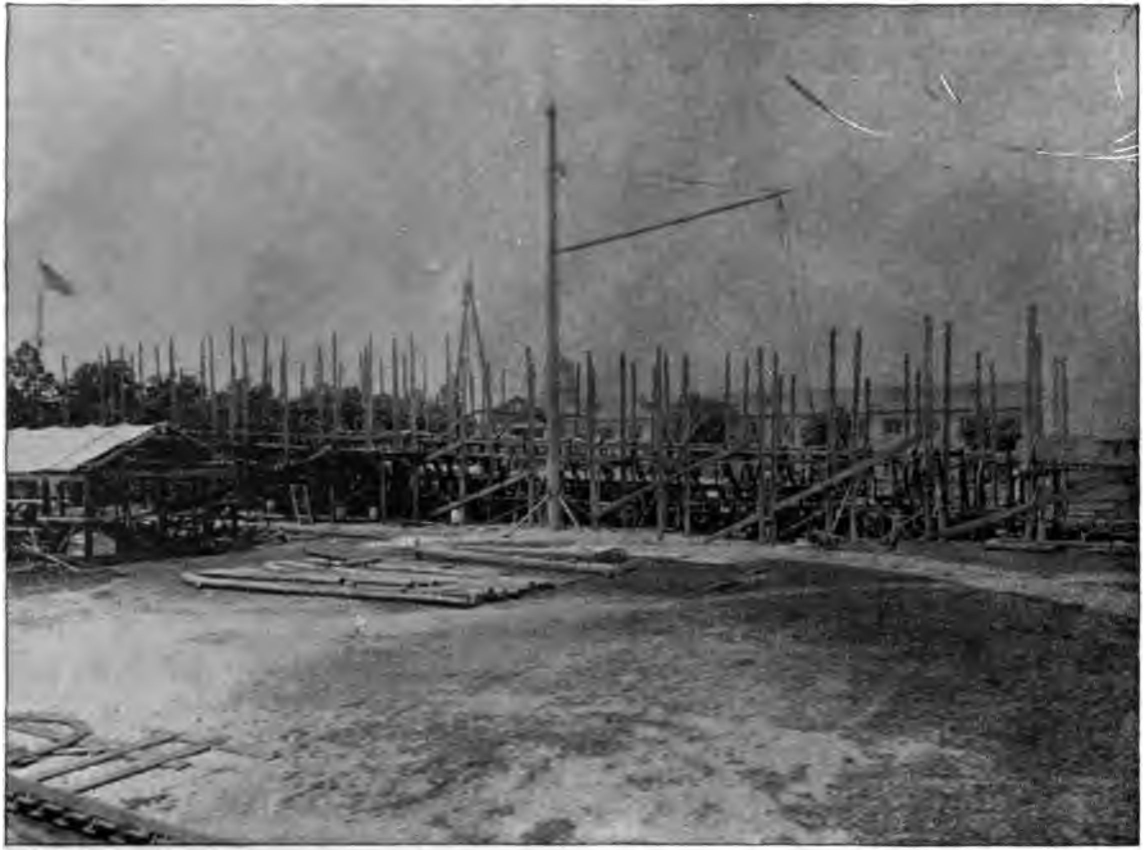
Chief Constructor T. D. WILSON, U. S. NAVY,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
CITY POINT WORKS,
South Boston, Mass., July 1, 1890.

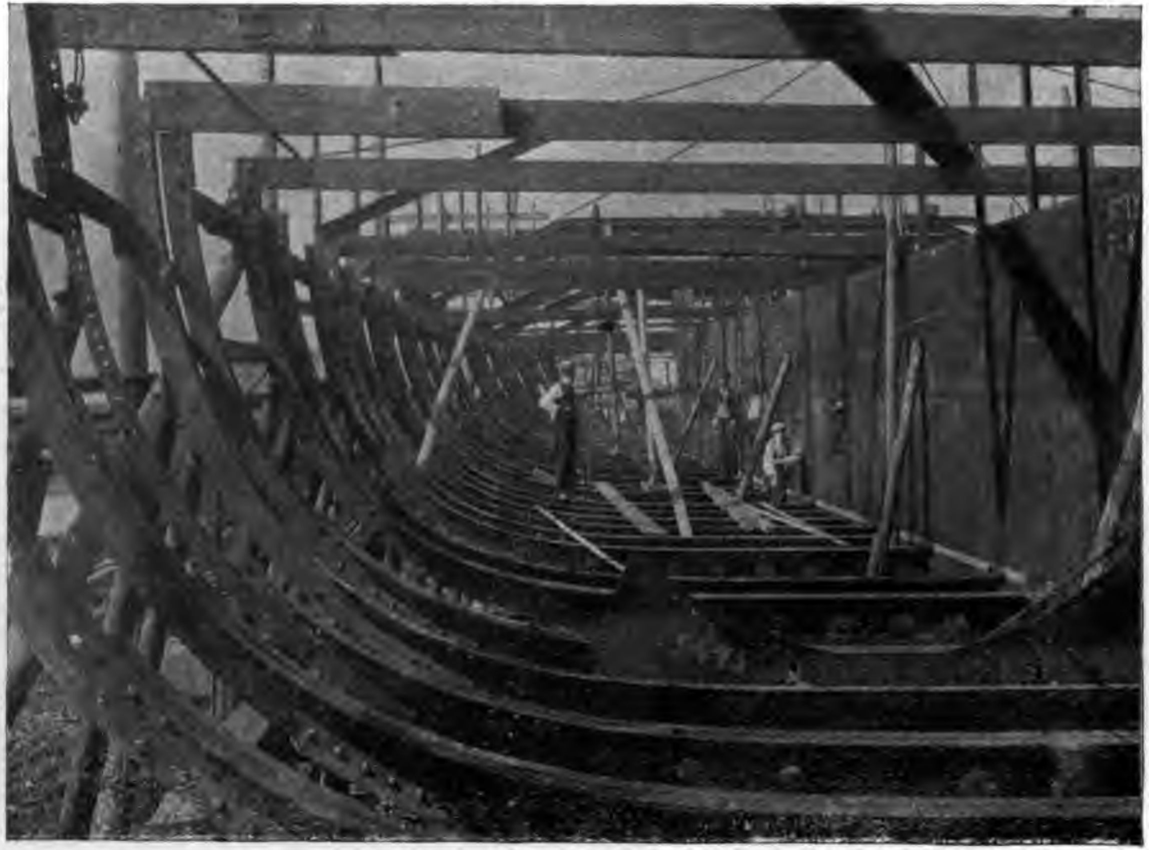
SIR: In reply to the Bureau's letter No. 5620, of June 25, I have to submit the following report of the condition of work on

CRUISER No. 11.

Very little progress has been made on this vessel up to this time as the contractor has had to build anew the entire ship-building portion of his yard and equip it with suitable tools. In a short time now the yard will be in a condition to advance this work rapidly.
The lines of the ship are laid down and faired, but the plate-edges, longitudinals, and decks have not yet been run in.
Stem pattern: Made and nearly ready for the foundry.



U. S. S. CRUISER NO. 8, NORFOLK, VA., JULY 7, 1890.



U. S. S. CRUISER NO. 10, BALTIMORE, MD., JULY 7, 1890. LOOKING FORWARD.

One hundred and sixty tons of steel shapes for the frames and decks have been scheduled and ordered.

Very little progress has been made on the working drawings, and only those of the stem and engine bearers have been completed.

Less than 1 per cent. of the work required under the contract has been completed, and with so little accomplished at the present time it is not practicable to name a probable date of completion of this vessel.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief of Bureau of Construction and Repair.

OFFICE SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
COLUMBIAN IRON WORKS AND DRY DOCK COMPANY,
Baltimore, Md., July 1, 1890.

SIR: In compliance with the Bureau's instructions of the 25th ultimo, I have to report the condition of work on

CRUISER NO. 10,

following as far as practicable the items given by headings of paragraphs in specifications, as follows, as near as can be estimated:

Vertical keel, flat keel: All in place.
Stem: In place.
Stern-post: Pattern made and shipped to steel-works.
Rudder: Pattern of frame shipped to steel-works:
Transverse frames: Material in yard—fifty-eight short Z-bars, with floor-plates and reverse angles, all in place. Much of the other material for the frames is bent.
Deck beams, water-tight beams: All in yard, and seven in place.
Poop and forecastle beams: In yard.
All angles for platforms, and nine-tenths of plates: In yard.
Carlings: About seven-tenths in yard.
Longitudinals: Most of the material in yard.
Flat keelson-plates: All in yard.
Outside plating: Most all in yard.
Center line bulk-heads: Material in yard; most of it in place.
Transverse bulk-heads: About one-half of the material in yard.
Water-tight deck: All plates in yard.
Girders: All material in yard.
Boiler-saddles: Six are in place; all materials in yard.
Air-ports: Fourteen casings, eight frames, and inside casings, with much of the small work is cast, much of which is finished.

Most of the outside plating and floor-plates have been pickled.

The flat and vertical keels have been mostly riveted up together with the frames that are in place.

Scuttles, coaling: Eight covers and casings about completed.

Amount of material incorporated in the hull:	Pounds.
Rolled steel	111,260
Rivets (driven)	1,970
Steel castings	5,275
Amount of material on hand to be incorporated in the hull:	
Rolled steel	732,937
Rivets	23,717
Cast-iron coal scuttles	1,583
Brass castings	3,297

The present condition of the ship shows that four-twentieths of the contract has been completed.

It is impossible, at this time, to give any idea as to the time of trial trips or delivery to the Government.

Very respectfully, your obedient servant,

WM. H. VARNEY, U. S. N.,
Superintending Constructor, Cruisers Nos. 9 *and* 10.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
COLUMBIAN IRON WORKS AND DRY DOCK COMPANY,
Baltimore, Md., July 1, 1890.

SIR: In compliance with the Bureau's instructions of the 25th ultimo I have to report the condition of work on

CRUISER No. 9,

following as far as practicable the items given by headings of paragraphs in specifications as follows as near as can be estimated:

Vertical keel: All in place.
Flat keel: All in place.
Stem: In place.
Stern-post: Pattern made and shipped to steel-works.
Rudder: Pattern of frame shipped to steel-works.
Transverse frames: Material in yard.
Fifty-eight short Z-bars, with floor-plates and reverse angles, all in place. Much of the other material for the frames is bent.
Deck-beams, water-tight beams. All in yard, and seven in place.
Poop and forecastle beams: In yard.
All the angles for platforms and about nine-tenths of the plates in yard.
Carlings: About seven-tenths in yard.
Longitudinals: Most of the material in yard.
Flat keelson-plates: All in yard.
Outside plating: Most all in yard.
Center-line bulk-heads: Material all in yard, and most of it in place.
Transverse bulk-heads: About one-half of the material in yard.
Water-tight decks: All plates in yard.
Girders: All material in yard.
Boiler-saddles: Six are in place; all material in yard.
Air-ports: Fourteen casings, eight frames, and inside casings, together with much of the small work is cast, much of which is finished.
Most of the outside plating and floor-plates have been pickled. The flat and vertical keels have been mostly riveted up together with the frames that are in place.
Scuttles, coaling: Eight covers and casings, about completed.

	Pounds.
Amount of material incorporated in the hull:	
Rolled steel	99,532
Rivets driven	1,980
Steel castings	55,240
Amount of material on hand to be incorporated in the hull:	
Rolled steel	668,131
Rivets	12,434
Cast-iron scuttles	1,583
Brass castings	2,734

The present condition of the ship shows that four-twentieths of the contract has been completed.

It is impossible at this time to give any idea as to the time of trial trips or delivery to the Government.

Very respectfully, your obedient servant,

WM. H. VARNEY, U. S. N.,
Superintending Constructor, Cruisers Nos. 9 and 10.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

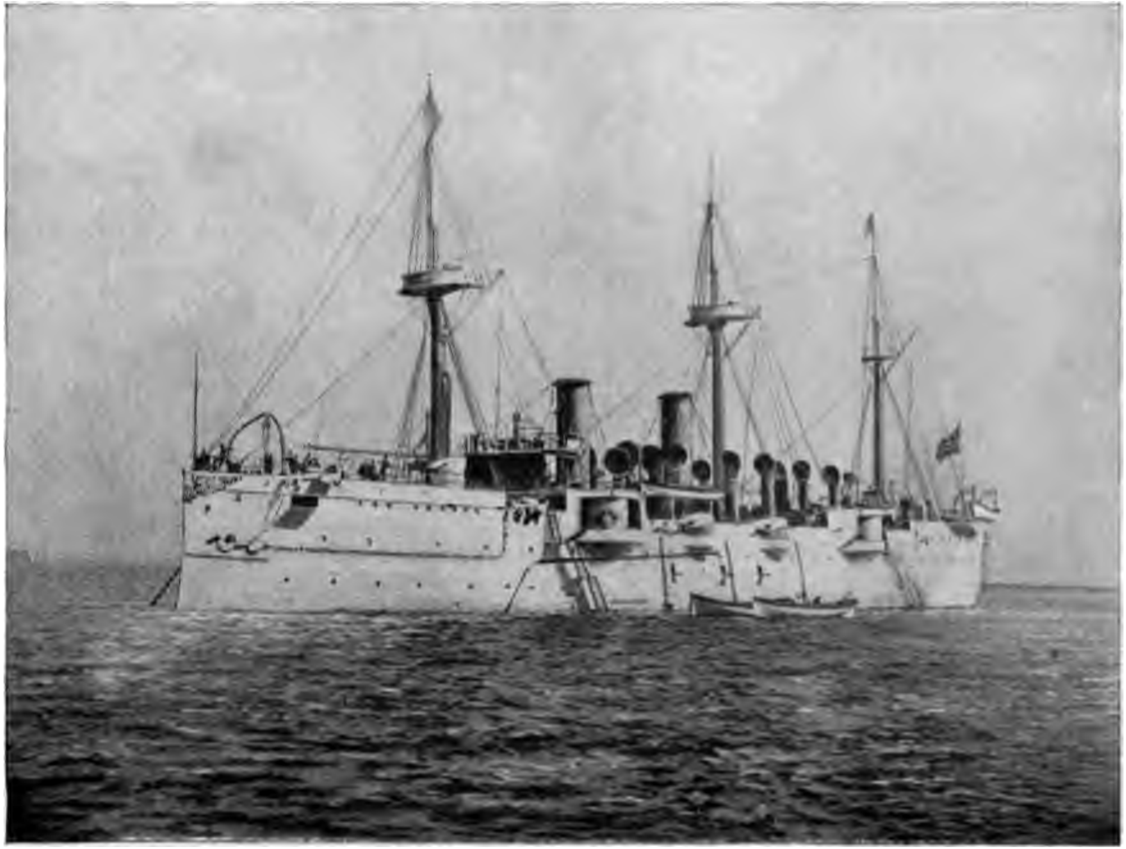
OFFICE OF SUPERINTENDING CONSTRUCTOR FOR U. S. NAVY,
Philadelphia, July 1, 1890.

SIR: In compliance with the Bureau's order of the 25th ultimo I have the honor to submit the following report of the condition of the

U. S. CRUISER PHILADELPHIA,

now being constructed at these works under my superintendence:

The *Philadelphia* is practically completed under the contract, having made her speed trial, east and west, over a 40-knot course, south of Long Island, on the 25th ultimo, showing an average speed, in the distance of 80.97 knots, of 19.678 knots per hour.



U. S. S. CRUISER PHILADELPHIA.

Some few items of work remain to be done to the hull, such as arrangement of boat cradles and chocks, the stowage of small fittings, the planing of decks, and painting.

The following is a statement of metal materials used in the construction of hull to date, viz:

Material.	Finished weights.	Pounds.	Tons.
Steel frames, plates, bars, beams, etc	3,968,762	4,140,993	$1848\frac{1473}{2240}$
Rivets	172,231		
Castings of steel and iron	....	360,531	$160\frac{2131}{2240}$
Iron, wrought, sheet, pipe, etc	....	349,804	$156\frac{364}{2240}$
Brass castings, pipe, air-ports, scuppers, etc	....	86,436	$38\frac{1316}{2240}$
Copper, sheet, pipe, etc	....	9,992	$4\frac{1032}{2240}$
Lead, sheet, pipe, etc	....	7,453	$3\frac{733}{2240}$
Zinc, sheet, rings, flanges, etc	....	408	$\frac{408}{2240}$
Solder, pewter	....	250	$\frac{250}{2240}$
Bell-metal	....	673	$\frac{673}{2240}$
Total	....	4,956,540	$2,212\frac{1660}{2240}$

It is estimated that this vessel will be ready for final delivery on or about August 1. Photographs, showing the condition of the ship, have been taken by F. Gutekunst, esq., and, with their negatives, will be forwarded to the Bureau by express.

Very respectfully, your obedient servant,

J. F. HANSCOM, U. S. N.,
Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
DELAWARE RIVER IRON WORKS,
Chester, Pa., July 26, 1890.

SIR: In obedience to the Bureau's letter of June 25, 1890, No. 5620, I have the honor to submit the following report, showing the actual condition of work on

GUN-BOAT No. 3, CONCORD,

July 1, 1890, made in detail, following as far as practicable the items given by heading of paragraphs in specifications, the percentage of completed work under the contract, the date when it is estimated the vessel will be ready for the contractor's trial, and for final delivery to the Government:

Vertical keel, flat keel-plates, stem, stern-post, rudder, transverse frames, main-deck beams, water-tight deck beams, berth-deck beams, poop and forecastle deck-beams, beams to platforms, decks, etc., half-beams and carlings, water-courses, longitudinals, the second longitudinal, the third longitudinal, the fourth longitudinal completed.

Flat keelson-plates, outside plating, transverse water-tight bulk-heads completed.

Coal-bunker and other fore and aft bulk-heads: Overhead railways in bunkers not yet completed.

Water-tight deck, girders to water-tight deck, bilge keels, shaft-tubes, and struts completed.

Water-tight doors: Two doors on bulk-head No. 59, in upper coal-bunker, and six on bulk-heads Nos. 45, 52, and 59, in lower coal-bunker, to be re-hung; inside handles of clamps of all coal-bunker bulk-head doors to be cut off and squared to receive socket lever; the doors on forward fire-room hatch on berth-deck to receive fastenings; door on after fire-room hatch berth-deck made, but yet to be hung and receive fastenings; one door on engine-room hatch berth-deck; three on forward fire-room hatch and two on after fire-room hatch spar-deck to be hung and receive fastenings.

Engine, boiler, and shaft-bearings, deck-stringers and plating (to poop and forecastle decks), main deck-stringer plates, berth-deck stringers, and plating, breast hooks, platforms, stanchions in hold, etc., stanchions under poop and forecastle decks, gutters on main-deck, holes in bulk-heads for engineer's pipes, plank-sheers, or waterways: Completed.

Deck-plank: Poop, forecastle, main, and berth decks to be planed: the sectional deck in passage ways and crew's bag-room made, but not yet in place.

Hammock-berthing: Bottom boards and angle strips of wood to be fitted.

Freeing ports: Arrangements for securing shutters when open on inside yet to be made and fitted.

Machine-gun and torpedo port shutters: Forward gun port shutters under forecastle yet to receive fastenings for securing in place. The after gun port shutters are yet to be fitted, hinged, and receive similar fastenings. The torpedo port shutters are to receive fastenings in like manner.

Topedo arrangements: Stopper plates and buckler rod and clamp to be made for forward tube. The shutter of the after tube is yet to be hinged and receive fastenings.

Sponsons for guns: The man-hole covers to be made and fitted.

Platforms for guns: Iron-work completed; wooden platforms made, but not fastened in place.

Gun supports, mast-partners, windlass bed, mast steps: Completed.

Hammock-hooks: All made and partly fitted.

Hatch coamings and skylights: Hatch coamings completed; the sylights made and fitted except skylight in after engine-room hatch.

Gratings and hatch covers: All solid covers completed; wood gratings for five hatches on forward berth-deck yet to be made.

Air-ports: Levers for opening the two square air-ports in cabin yet to be fitted: lanyards to be fitted for raising same.

Ladders (side), sea-steps, etc.: Ladders (side) and sea-steps completed; sentry walk yet to be fitted.

Awning stanchions: To be fitted and galvanized.

Guard-rails and stanchions: Stanchions completed; guard-rails yet to be erected.

Canopies: All canopy frames, with the exception of engine-room hatch, made and stanchions fitted; frames yet to be fitted to stanchions.

Iron rounds or ladders: Completed.

Ladders to hatchways, etc.: All ladders made and partly erected; iron ladders for engineer's work-shop yet to be made.

Hatch cranes: All fitted, except to forward passing scuttle on forecastle-deck; those of iron yet to be galvanized.

Shot-racks and musket-racks: Shot-racks yet to be made; musket racks made and partly erected.

Attachment for rigging, chain-plates, bolts, etc: Completed.

Lashing bolts and shackles for securing guns: To be furnished by Ordnance Department, not yet received.

Chocks for fair-leaders: Completed, except where necessary for raising torpedo shutters and air-ports.

Pin-rails: All pin-rails completed, except boring for pins and fitting brass-rubbing plates.

Lumber-irons: Yet to be fitted.

Life-buoy guards: Not made.

Brass-rubbing plates: Not completed.

Jacob's ladders: Fittings completed.

Running-lights: Fittings not yet made.

Swinging-booms: Fittings completed.

Ensign-staff: Step and brace completed.

Deck-lights: Three lights to be refitted, and hooks to be fitted below deck to top up the glass when open.

Watch-bell: Made but not erected.

Boat-davits and cradles: The davits are made and partly erected; the cradles partly made.

Galley-house, bed, etc.: Doors to be fitted and hung; glass lights, handles, and hooks, to be fitted; the shutters, metal shelves, lockers, fresh and salt water hand-pumps, sink, and coal box, yet to be made and fitted.

Coffer-dams: Completed.

Bow-stoppers: Not made.

Hawse-pipes: Completed.

Steam-windlass and capstan: Capstan bars yet to be made and stowed.

Deck-pipes: Completed.

Manger: Yet to be cemented, and drain-pipes fitted.

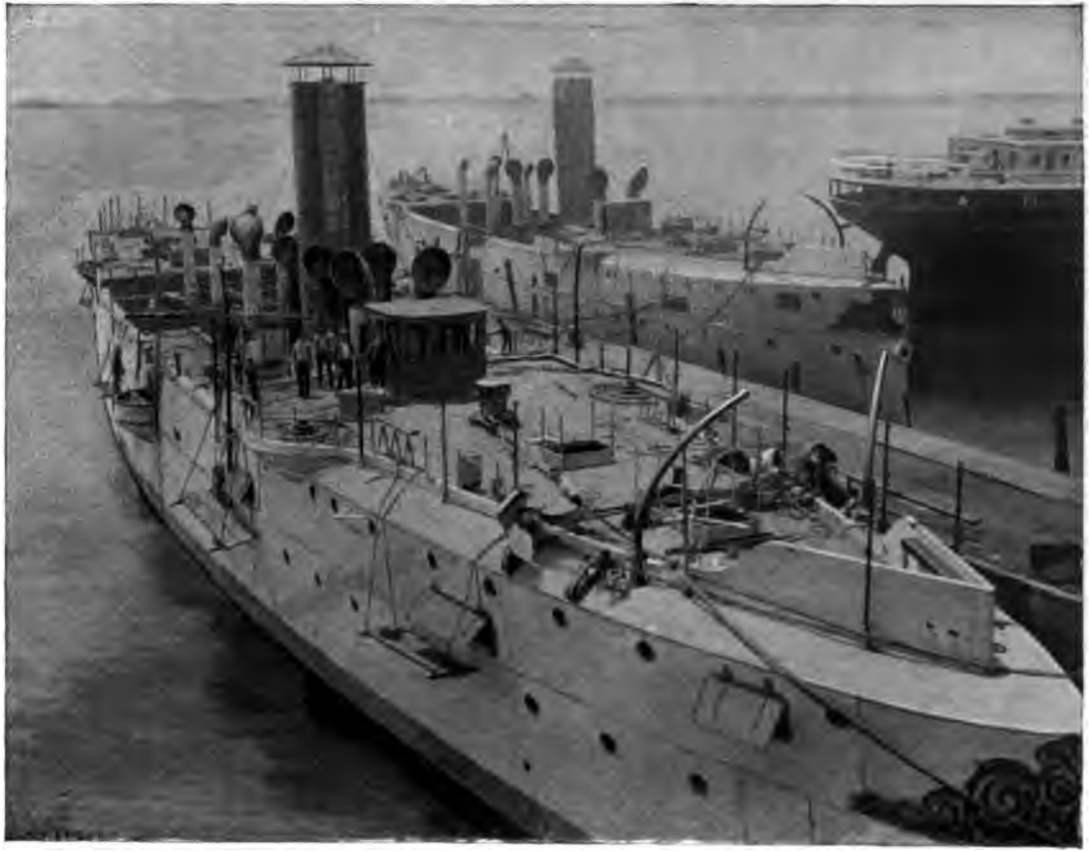
Warping-pipes: Forward pipes yet to receive shutters, after pipes not made.

Warping or towing bitts: Completed.

Ring-bolts in deck, anchor davits, bill boards: Completed.

Conning-tower and shield for entrance to same: Wrenches to be made for operating.

Wood pilot-house: Doors, sash, blinds, transom seat, and chart-table yet to be fitted; inside of house yet to be sheathed.



U. S. GUNBOAT CONCORD, CHESTER, PA., JULY 28, 1890.

Steering apparatus: Lugs in quadrant to be fitted to receive wire rope, and means provided to take up slack, also lugs to be secured to lower edge of quadrant to prevent wire rope from slipping out of groove; wire rope to steam steerer to be rove; steering-wheel stands and gear in conning-tower, pilot-house, and quarter-deck made, but not yet fitted and erected; hand steering wheel under poop-deck partly made, but not erected.

Chain-lockers: Completed.

Water-tanks: To be cemented, and covers fitted for locking.

Ash-chutes: Hoppers and covers to be made and fitted; benders to be fitted.

Coal-scuttles: Completed as far as practicable.

Trunks to coal-bunkers: Chains for lifting doors yet to be fitted.

Wood floors in coal-bunkers, magazines: Completed.

Passing-scuttles: Brass covers to be fitted; wrench to be stowed.

Shell-rooms, fixed ammunition room: Completed.

Torpedo-rooms and torpedo-magazines: Racks to be made and fitted.

Ventilation: The additional ventilation to berth-deck, authorized by the Department, requires the fitting of four valves, three pipes, and eight registers to complete same. The additional fresh-air supply and exhaust from dynamo-room, authorized by the Department, yet to be made. All the gear for fire valves of ventilating system in magazines yet to be cased and marked.

Pumping arrangements: Main-deck hand-pumps fitted; stands and brakes yet to be galvanized; pumps yet to be fitted in galley-house; steam-pumping system completed, except marking the valves in engine-rooms.

Sluice-valves, pipes, etc.: To be marked.

Sounding-tubes: Completed.

Speaking-tubes and telegraphs: Mechanical telegraphs and speaking-tubes completed with the exception of conning-tower bridge; thermostats yet to be fitted in lower coal-bunkers; water alarms completed; helm indicator completed, except fastening quadrant to rudder-head, and steering-wheel stands.

Ceiling in hold, store-rooms, etc.: Completed.

Ward-room: Brass air ventilators and name-plates yet to be fitted over state-room doors, and all wood-work yet to receive the finishing coats of paint.

Steerages: Yet to receive the finishing coats of paint.

Cabins under poop-deck: Side paneling, transom seats, and overhead paneling in bath-room yet to be fitted and receive finishing coats of paint and varnish.

Chronometer and compass locker: Not made.

Sail-room, general store-rooms: Completed.

Paymaster's office: Letter file, or locker on bulk-head, yet to be fitted.

Armory: One cutlass-rack to be fitted.

Prisons: Door to be fitted, hung, and receive fastenings.

Master-at-arms locker: Not made.

Signal locker: Not made.

Rudder mold: Completed.

Dispensary: Knobs and locks to be fitted to drawers.

Engineer's workshop: One small locker yet to be fitted.

Engineer's stores: Completed.

Pantries: Locks and knobs on drawers and lockers yet to be fitted; hooks yet to be fitted.

Water-closets: Urinal connections to be made in crew's closets; joiner work yet to be fitted in officer's closet.

Firemen's wash-rooms: Gratings made, but not fitted; bath-tub connections yet to be made.

Lavatories for officers and crew: Completed.

Reels: Hose reels made, two yet to be erected; hawser reels yet to be made.

Brass label plates: Made, yet to be fitted.

Mess and clothes lockers for crew: About one-half made, yet to be fitted in ship.

Eyebolts in beams: Eyebolts for anchor chain completed; for removing stores not made.

Lamp-room: Completed.

Oil tanks: Made, yet to be fitted, marked and painted.

Cleaning, galvanizing, etc., and painting steel or iron work: This has been done as the work progressed.

Painting, graining, polishing wood-work: Cabin, ward-room, steerage, and forward berth-deck yet to receive the finishing coats of paint.

Calking: Completed.

Varnishing decks: Poop and forecastle decks completed.

Figures for draught of water, cement, scuppers: Completed.

Electric call-bells: Completed with the exception of those on the bridge.

Electric lighting apparatus: Wires yet to be attached to fixtures. The insulating blocks of all water-tight switches have been removed in order that a defect in switch boards may be remedied; a small amount of wiring yet to be done in cabin; all cabin fixtures, switch boards, engines, dynamos, and search lights yet to be installed.

Swinging tables and benches for crew: All made and partly erected.

Bridge: Patterns for brass-work partly made and wood beams partly worked.

Forced draught in fire-rooms: This system has been changed to the "Kafer system."

The percentage of work completed under the contract is estimated at 90 per cent.

I estimate that the vessel will be ready for the contractor's trial on August 11, 1890, and for final delivery to the Government on September 10, 1890.

I am informed by the inspector of machinery that the engines and boilers are completed.

The following details are not quite completed:

Putting in new pistons for blower engines; fitting traveler-bars for handing various parts of the machinery; marking a part of the valve hand wheels; fitting tachometers and counters; putting in racks for fire tools, spare tubes, and wrenches; the steam-heating of pantries, and the hinging of after fire-room ventilators.

The dynamo engines are not here, and a part of the piping connected with these engines can not be fitted until they arrive.

Bolts for securing gun-centers, circles, etc., supplied by the Bureau of Ordnance, not yet received, and joiner work under same can not be completed.

Very respectfully your obedient servant,

R. W. STEELE,
Naval Constructor, U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTUCTOR FOR U. S. NAVY,
Philadelphia, July 1, 1890.

SIR: In compliance with the Bureau's order of the 25th ultimo, No. 5620, I have the honor to submit the following report of the condition of hull work of the

U. S. CRUISER NEWARK,

now being constructed at these works under my superintendence:

The vessel may be said to be more than nine-tenths completed; bills for the ninth payment having been certified to on the 7th ultimo.

The following is a detailed statement of the condition of the hull work:

The inner bottom: Is completed with the exception of the air-escape pipes, and the testing of the several compartments as to water-tightness.

All the coal-bunkers, wing-passage, shaft-alley, and inclosure bulk-heads are completed.

Water-tight doors: Completed, except the sliding doors leading to fire-rooms.

Sluice valves: Completed, except the socket levers and the name plates which are finished in shop.

Sounding-tubes: About one-half fitted in place, and the balance are being prepared in shop.

Coaling trunks: Completed, except the sliding doors and the fitting of the necessary appliances for raising the shutters in armor-deck.

Forward magazine: Completed, with the exception of sliding trays for powder cylinders.

After magazine metal-work: Completed; requiring testing as to water-tightness, and the joiner-work put in.

Forward shell-room: Complete, except the light box, and the after one, like the magazine, requires the joiner work.

Fixed ammunition room, torpedo magazine and outfit, and store-rooms: Complete, except racks and shelves, which have yet to be fitted.

Passing scuttles: Not yet in place.

Torpedo arrangements, coming under contract: Not yet completed; the holes are cut in sides of vessel, but the steel castings, plate shutters, etc., are not yet made.

Gun sponsons: Completed, but the platforms have to be squared and recalked; also the platforms for machine guns have to be made and fitted in place.

Gun supports: Metal-work is completed; the inclosures having yet to be fitted with shelving, etc.

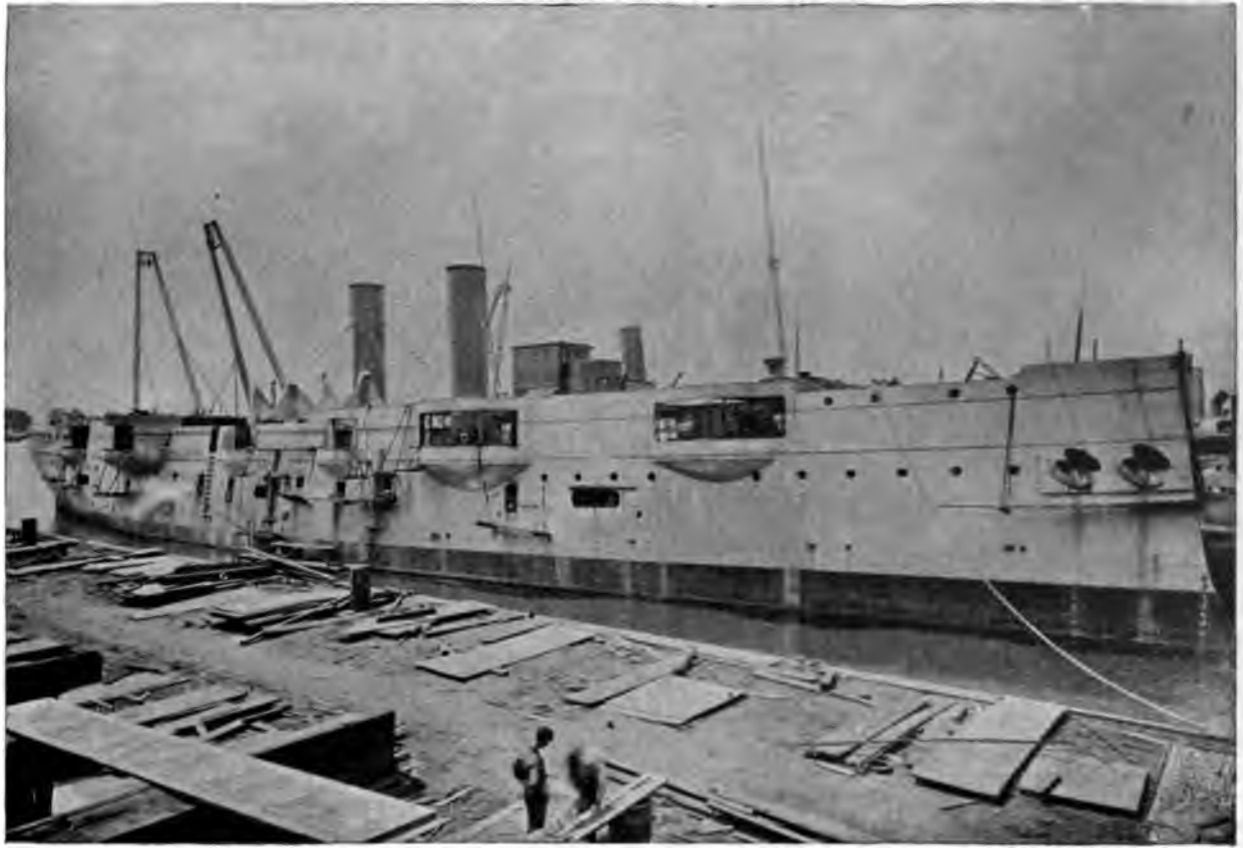
Mast steps: Patterns for steps are at the foundry.

Air-ports: Completed, except within the coaling-port shutters where the holes have been cut.

Scuppers: Finished, except five additional parts for berth-deck, with check valve; these are being cast.

Gutters on gun-deck: Finished; the gratings are made, but not fitted in place.

Hammock-berthing: Practically completed; eyes for lashing the hammock-cloth have yet to be put in.



U. S. S. NEWARK, PHILADELPHIA, PA., JULY, 1890.

Hatch coamings and skylights: Completed, except the boiler-hatches, which require covering plates and some work around the ash-hoists.

Wood gratings: Nearly all fitted in place.

Iron gratings: Now being fitted on the engine, fire-room, and boiler-hatches.

Awning stanchions: Commenced, in accordance with definitely prepared plans. The canopy frames of brass and iron are yet to be made.

Ash ladders to hatchways: Nearly all made and fitted in place.

Hatch-cranes, shot and musket racks: Yet to be made and fitted.

Attachments for rigging (chain plates): For mizzen rigging are in place; the fore and main have yet to be fitted.

Eye and Lewis bolts: Mostly fitted in decks.

Guard rails and stanchions for poop, forecastle deck, and bridges: Partly made, but have all to be fitted in place.

Fife and pin rails and top-sail sheet bitts: Not yet commenced.

Life-buoy guards: Yet to be made and fitted.

Running-light boxes and attachments, swinging-boom fittings and ensign-staff socket: Not yet commenced.

Watch-bell (presented by the city of Newark, N. J.): Being hung in place.

Boat davits and cradles: Commenced.

Hammock hooks: Partly in place.

Wooden pilot-house: Very nearly completed; the transom, chart table, etc., have yet to be put in.

Conning-tower and shield: Completed, except cutting sight holes and laying flooring.

Steering apparatus: Now being fitted up; the heavy parts of tiller being on board and partly in place. The steam-steering engine, the shafting, standards, and hand-wheels are well advanced, at the works of the steering-engine builders, the Messrs. Williamson Bros.

Galley house: Nearly completed; one plate being left off to admit galley. The dressers, sinks and pumps have yet to be fitted and the flooring laid, either of tiling or other material.

Ash chutes at sides: Completed and the ash hoists and ventilators are nearly completed to the deck.

Manger: Requires cementing.

Stern warping pipe: Not yet received from foundry.

Chain pipes: Completed.

Water-tanks: Completed, except the connections from pumps.

Coaling scuttles in deck: Very nearly complete.

Templets: Made for side ladders and the work is under way in shop.

Sentry walk: Not yet commenced.

Windlass and capstan: Nearly fitted in place.

Hawse-pipes, collars, bow-stoppers, riding-bitts, and wire-cable nippers. All complete.

Patterns are made for collars and rollers to cable, through bulk-head forward of windlass.

Deck-stopper and other securing bolts: Have yet to be put in deck.

Anchor davits: Commenced.

Bill-boards: Awaiting delivery of anchors.

Mast-partners: Completed.

Drainage: Finished within the inner bottom. Rods for operating valves are being fitted.

Sluice valves: Forward of the double bottoms are fitted; those abaft are not fitted.

Cistern connections: Nearly completed; pumps are all in place, except the 4½-inch lift pump.

Suction-pipe: Connections nearly complete, and the fire-main and connections complete, except to steam-pumps.

Ventilation: Complete, except the pipes and cowls above the deck and the gear for operating cowls from deck. The natural ventilation of coal-bunkers is completed, both the fresh-air supply and the foul-air exhaust. The forced draught in fire-rooms is nearly completed, including air-locks to berth-deck.

Voice pipes: Nearly all run below protective-deck; the termini have yet to be completed with the mouth-pieces, etc.

Mechanical telegraphs and electric call-bell wires: Yet to be installed.

Ceiling in hold, store-rooms, etc.: Complete, except steel sheathing between decks.

Ward room: Completed, except the wire-screen panels over the bulk-heads and the two gun-support inclosures, which can not be finished until the gun circles are down.

Cabins: Under poop-deck are nearly completed; some joiner work in state-rooms and bath rooms yet to be done.

Junior officers' quarters: Yet to be fitted with the joiner work.

Sail-room: Completed, except rollers at hatchway.

General and other store rooms: Completed, except a few minor fittings yet to go in.
Paymaster's office, signal locker, armory, prisons, and master-at-arms' locker: Yet to be fitted.
Dispensary and sick bay, including bath and water-closet: Completed.
Engineer's work-shop: Is being enlarged, in accordance with the approved plans, and is nearly completed.
Ordnance work-shop: Nearly completed.
Pantries: Complete, except pump and drainage connections.
Water-closets (officers'): Very nearly completed; drainage connections and cementing yet to be done.
Firemen's wash-rooms: Yet to be fitted with basins, pumps, wire lockers, shelves, etc.
Lavatories for officers: Yet to be fitted with tanks, wash-bowls, etc.
Brass label plates to drainage valves and ventilators: Yet to be fittted.
Mess and clothes lockers: Nearly completed but have yet to be fitted in place.
Lamp room: Yet to be fitted up in gun support, and the oil tanks are to be made and stowed.
Moldings: For wires of electric lighting apparatus are well in place in cabins, ward-room, etc.
Dynamos and engines: Not yet received from manufacturers.
Swinging tables and benches for seamen: Yet to be made and stowed.
The entire inside has received one coat of red lead and cork paint where required, except under the forecastle and in after magazine and shell-room. The inner bottom has been given the requisite three coats of red lead. The outside, below water-line, has also received the three coats of red lead; above the water-line the hull has received one coat of metallic paint, three of cement, and one of lead color.
The decks will have to be calked with one additional thread of oakum before vessel is completed.
Cementing: Completed, except in the manger and coal-bunkers and a few places under the engine beds.

The following is a statement of metal materials used in the construction of hull, to date, viz:

Materials.	Finished weights.	Pounds.	Tons.
Steel frames, plates, bars, beams, etc	3,422,534	3,602,759	1,608 $\frac{839}{2240}$
Rivets	180,225		
Castings of steel and iron	....	134,194	59 $\frac{2034}{2240}$
Iron, wrought, sheet, pipe, etc	....	134,581	60 $\frac{181}{2240}$
Brass castings, pipe, air-ports, scuppers, etc	....	44,190	19 $\frac{1630}{2240}$
Copper, sheet, pipe, etc	....	849	$\frac{849}{2240}$
Lead	....	2,303	1 $\frac{63}{2240}$
Zinc, sheet, rings, flanges, etc	....	234	$\frac{234}{2240}$
Solder	....	603	$\frac{603}{2240}$
Total	....	3,919,722	1,749 $\frac{1962}{2240}$

It is estimated that the *Newark* will be ready for her official trial by October 20, 1890, and for final delivery by December 10 following.

Photographs of this vessel, taken by F. Gutekunst, esq., have been delivered here, and, with their negatives, will be forwarded to the Bureau by express.

Very respectfully, your obedient servant,

J. F. HANSCOM, U. S. N.,
Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
DELAWARE RIVER IRON WORKS,
Chester, Pa., July 28, 1890.

SIR: In obedience to the Bureau's letter of June 25, 1890, No. 5620, I have the honor to submit the following report, showing the actual condition of work on

GUNBOAT NO. 4, BENNINGTON,

July 1, 1890, made in detail, following as far as practicable the items given by heading of paragraphs in specifications, the percentage of completed work under the contract, and the date when it is estimated the vessel will be ready for the contractor's trial and for final delivery to the Government:

Vertical keel, flat keel plates, stem, stern post, rudder, transverse frames. main deck beams, water-tight deck beams, berth-deck beams, poop and forecastle deck beams, beams to platform, deck, etc., half beams and carlings, water courses, longitudinal, the second longitudinal, the third longitudinal, the fourth longitudinal, flat keelson plates, outside plating, transverse water-tight bulk-heads, all completed.

Coal-bunker and all fore and aft bulk-heads completed.

Overhead railway partly erected: hangers made, but yet to be fitted; trollies yet to be made.

Water-tight deck: All plating completed; forward water-tight hatch-covers made; after water-tight hatch covers yet to be made and fitted.

Girders to water-tight deck, bilge keels, shaft-tubes, and struts: Completed.

Water-tight doors: Three on forward fire-room hatch, two on after fire-room hatch, and two on bulk-head No. 91, spar-deck, to be fitted, hung, and receive fastenings; two doors on bulk-head No. 86, one on engineer's workshop, two at after firemen's wash-room, two at forward firemen's wash-room, one in passageway, two on bulk-head No. 35, one on bulk-head No. 19, and one on bulk-head No. 7, water-tight deck to receive fastenings; two doors on bulk-head No. 59, upper coal-bunker, and two on bulk-head No. 45, lower bunker, to be changed; inside handles of all clamps on coal-bunker doors to be cut off and squared to receive socket lever on inside.

Engine, boiler, and shaft bearings, deck stringers, and plating, berth-deck stringers and plating, breast hooks, platforms, stanchions in hold, etc.: Completed.

Stanchions under poop and forecastle decks: Three stanchions under poop-deck yet to be made.

Gutters on main-deck: Bottom and top edge of bars yet to be calked.

Holes in bulk-heads for engineer's pipes, plank shears, or waterways: Completed.

Deck plank: Forecastle, poop, spar, and berth decks yet to be planed; the sectional deck in passageways and crew's bag-rooms made, but not yet in place.

Hammock berthing: The inside plating, with the exception of four plates amidships, is yet to be worked and erected; the yellow pine rail on inside is yet to be worked and secured; berthing boards to be made and fitted; eyes for securing hammock cloths to be fitted.

Freeing ports: Shutters to be fitted and hung; arrangement for receiving shutters yet to be made.

Machine, gun, and torpedo port shutters: The frames for the forward and after gun port shutters are partly made; hinges, clamps, etc., are yet to be made. Torpedo port shutter frames partly made; hinges made but not fitted; clamps, etc., yet to be made.

Torpedo arrangements: Stopper plate, buckler rod, and clamp yet to be made and fitted for forward tube. The shutter for after tube is made, but yet to be hinged and receive fastenings.

Sponsons for guns: The man-hole covers yet to be made and fitted.

Platforms for guns: Wood platforms and iron-work for same all made, but yet to be fitted in place.

Gun supports: Two iron doors on spar-deck and four wooden doors on berth-deck yet to be made, fitted, and hung.

Mast partners, windlass-bed, mast steps: Completed.

Hammock hooks; Made, but yet to be fitted to ship.

Hatch coamings and skylights: Coaming on poop-deck completed; skylights made but not fitted; coamings and skylight for engine hatch and galley house, made but yet to be fitted in place.

Gratings and hatch-covers: Berth-deck wooden hatch-covers complete, with the exception of handles for lifting. Gratings yet to be made; rabbets to be fitted to all hatches to receive gratings.

Air-ports: All made; seven yet to be fitted to ship.

Ladders (side) sea-steps, etc.: Made, but yet to be fitted on the vessel.

Awning-stanchions: Sockets made, but yet to be fitted and secured; stanchions about half made.

Guard-rails and stanchions: Stanchions completed; guard-rails yet to be fitted.

Canopies: Sockets yet to be fitted to ship frames; about one-half made.

Iron rounds or ladders: Completed.

Ladders to hatchways, etc.: Yet to be made.

Hatch-cranes: Made, but yet to be galvanized and fitted.

Shot racks and musket racks: Shot racks yet to be made; musket racks made, yet to be fitted.

Attachment for rigging, chain plates, bolts, etc.: Chain plates on poop and forecastle complete; chain plates on main deck yet to be made; all attachments for rigging made.

Lashing bolts and shackles for securing guns: To be supplied by Ordnance Department, but not yet received.
Chocks for fair-leaders: Made, yet to be fitted to ship.
Pin rails: Poop and forecastle pin rails complete, with the exception of fitting brass rubbing plate and boring for pins; main-deck rails made, but not fitted to ship.
Lumber irons: Not yet made.
Life-buoy guards: Not yet made or fitted.
Brass rubbing-plates, etc.: Not yet made
Jacob's ladders: Fittings completed.
Running lights: Fittings not yet made.
Swinging booms: Fittings made, but yet to be fitted to ship.
Ensign staff: Step and brace completed.
Deck-lights: Drain cocks and hooks for tricing up yet to be fitted.
Watch-bell: Made, yet to be fitted.
Boat davits and cradles: Davits made, yet to be fitted; cradles yet to be made; beams for receiving cradles of after boats yet to be fitted and secured.
Galley-house, bed, etc.: Iron doors yet to be made and erected. The sliding iron shutters are fitted to house, but yet to receive glass lights, hooks, and handles; all shelving, lockers, coal-box, fresh and salt water hand-pumps, sinks, etc. Cement and tiling floor yet to be done.
Coffer-dams: Top of coffer-dams yet to receive bead; all water-tight covers and drain-cocks yet to be fitted.
Bow-stoppers: Not yet made.
Hawse-pipes: The inboard lip made, but yet to be fitted and secured.
Steam windlass and capstan: All secured in place, but capstan bars not yet made or fitted in rack.
Deck pipes: Completed.
Manger: Yet to be cemented and drain pipes fitted.
Warping pipes: Forward pipes yet to receive shutters; after pipes not made.
Warping or towing bitts, ring bolts in deck, anchor davits: All completed.
Bill-boards: Not yet made.
Conning-tower and shield for entrance to same: Top edge to be faired; adjustable supports for top plate and wrenches for operating yet to be made, fitted, and stowed.
Wood pilot-house: Sections, sills, etc., all made, but nothing done towards erecting.
Steering apparatus: Steering-wheels and stands cast, but yet to be fitted and erected. Main steering rope yet to be secured and fitted; quadrant arrangements for taking up slack in rope yet to be made; all gearing, shafting, etc., connecting steering-wheels in conning-tower and pilot-house with steam-steering engine yet to be made and fitted.
Chain-lockers: Completed.
Water tanks: To be cemented and receive drain-pipes or screw-plugs.
Ash chutes: The two after chutes are secured to the vessel; the forward ones are shaped, but yet to be fitted and secured; all yet to receive hoppers, fastenings, etc.
Coal scuttles: Completed.
Trunks to coal-bunkers: Fastenings to all doors to be secured; four doors yet to be made.
Wood floors in coal-bunkers, magazines, passing scuttles: Completed.
Shell-rooms: Forward shell-room complete; after room yet to receive gratings and sheathing.
Fixed ammunition-room: Yet to be sheathed and receive gratings.
Torpedo-rooms and torpedo magazines: All joiner work yet to be done.
Ventilation: All main pipes, of both fresh air and exhaust of main system, completed; all connections yet to be made, and registers fitted. The additional ventilation to dynamo-room, as authorized by the Department, yet to be made, and fire-valves yet to be fitted.
Forced draught in fire-rooms: This system has been changed to the "Kafer system."
Pumping arrangements: One hose valve and connections on forecastle deck, and one on poop deck yet to be fitted; all piping of fire-main complete, but yet to be cased in coal-bunkers; spanners for hose valves yet to be made and stowed; all tanks for wash-rooms, water-closets, etc., yet to be made and fitted; all basins in wash-rooms and water-closets, and all sinks, hand-pumps, etc., with their necessary pipe connections and plumbing yet to be installed; galvanized iron bath-tub in firemen's wash-room, as authorized by the Department, yet to be fitted; drain pipes yet to be fitted to fresh-water tanks; all hand deck-pump brakes, handles, and stands yet to be made, galvanized, and stowed.
Sluice-valves, pipes, etc.: Connections for operating sluice-valves yet to be made; two overflow valve connections yet to be made; piping to after magazine flood-cocks to be fitted.
Sounding tubes: Completed.

Speaking-tubes and telegraphs: Mechanical telegraphs about one-half completed; wiring for all call-bells below water-tight deck finished; speaking-tubes about three-quarters completed; wiring for water alarms completed; molding and wiring for thermostats about one-half completed; helm indicator not yet made; shrieking-whistle lead prepared for wires.

Ceiling in hold, store-rooms, etc.: Not yet made.

Ward room: Beam casings and furring strips up to receive overhead paneling sheathing; all sections are made, but nothing done towards erecting.

Steerages: Beam castings and furring strips fitted to receive overhead paneling and sheahing; all sections are made, but nothing yet done towards erecting.

Cabins under poop-deck: Beam casings and furring strips fitted to receive overhead paneling and sheathing; sills to receive sections fitted and fastened; sections all made, but nothing yet done towards erecting.

Chronometer and compass locker: Not yet made.

Sail-room: Completed.

General and store rooms: Joiner work yet to be done.

Paymaster's office: Nothing yet done.

Armory: Nothing yet done.

Prisons: Iron door to be made, fitted, and hung.

Master-at-arms locker: Not yet made.

Signal lockers: Not yet made.

Rudder mold: Not yet made.

Dispensary: Wooden sections erected, sheathing partly done, but no shelving, sink, drawers, lockers, etc., made.

Engineer's work shop: Iron floor to be fitted; ladders to be made and erected; work bench yet to be made; two lockers for machinists' tools yet to be made.

Engineer's stores: All lockers and shelves yet to be made, with the exception of one locker in after engine-room.

Pantries: All joiner work and plumbing fittings yet to be done.

Water-closets: Yet to receive all necessary plumbing, fittings, piping, and joiner work.

Firemen's wash-rooms: To receive all plumbing, fittings, flooring, etc.

Lavatories for officers and crew: Yet to receive all plumbing, fittings, joiner work, etc.

Reels: Hawser reels yet to be made; hose reels made, but yet to be erected.

Brass label plates: Made, but yet to be secured.

Mess and clothes lockers for crew: Being made in New York, but not yet delivered for fitting.

Eye-bolts in beams: Made, yet to be fitted.

Lamp room: Yet to receive shelving, hooks, etc.

Oil tanks: Made, but yet to be secured; piping, valves, etc., for filling tanks yet to be fitted; name plates to be fitted to each tank.

Cleaning, galvanizing, etc., and painting steel or iron work: This has been done as the work progressed.

Painting, graining, polishing wood-work: Nothing yet done.

Calking: Decks to be recalked; all decks to be planed.

Varnishing decks: Nothing yet done.

Figures for draught of water: Completed.

Cement: Tanks, galley-house, manger, crew's wash-rooms, water-closets, and bottom of hammock-berthing yet to be cemented.

Scuppers: All connections from hammock-berthing, main-deck scuppers, and coffer-dams yet to be done.

Electric call bells: All molding forward of streerage and below water-tight deck completed; wires yet to be run.

Electric lighting apparatus: In lower hold, forward, molding completed; wire yet to be run in lower hold; aft, molding completed; wire run from dynamo room to after end of engine-room; coal-bunker section molding completed; wire run except in bunkers, fire and engine rooms; berth-deck, forward, molding completed; wire yet to be run; berth-deck, aft, all drilling completed; molding and wire yet to be run: spar-deck section, all drilling completed; molding completed; from dynamo room to spar-deck, wire yet to be run; cabin section, drilling completed; molding and wire run from dynamo room to cabin; switch boards, engines, dynamos, search-light section, and all fixtures yet to be installed.

Swinging tables and benches for crew: Made, but yet to be stowed in their places.

Bridge: Mahogany beams worked, and patterns for brass-work made.

The percentage of completed work, under the contract, is estimated at 75 per cent.

I estimate that the vessel will be ready for the contractor's trial on November 11, 1890, and for final delivery to the Government on December 11, 1890.

I am informed by the inspector of machinery that the engines and boilers are completed.

The following details are not quite completed: Cylinder casings, heads, and covers, one-half the lagging to be fitted, auxiliary exhaust main to be connected to the electric-light plant; evaporator, distiller, and pump finished, except putting in trap and drain pipes; boiler and attachments finished, except brick-work in combustion-chambers, and steam-pipe connections to dynamo engines; boiler and pipe clothing about one-half finished; ventilators finished, except four adjacent to the smoke-pipe; radiators not in position; drain pipes and traps finished, except placing traps; fitting tachometers. The dynamo engines are not here, and part of the piping connected with these engines can not be fitted until the engines arrive. Bolts for securing gun-centers, circles, etc., supplied by the Bureau of Ordnance, not yet received, and joiner work under same can not be completed. Centers, tracks, and circles for 6-inch amidship guns not yet delivered.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor, U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief of Bureau of Construction and Repair.

APPENDIX L.

FOLLOWING ARE SUPPLEMENTARY REPORTS SHOWING THE CONDITION OF WORK ON VESSELS BUILDING OR COMPLETING AT NAVY-YARDS OR UNDER CONTRACT ON THE 1ST OF OCTOBER, 1890. AND A REPORT FROM NAVY-YARD, MARE ISLAND, CAL., SHOWING THE CONDITION OF THE SHIP-BUILDING PLANT AT THAT YARD.

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-Yard, New York, October 7, 1890.

SIR: In compliance with the Bureau's letter of the 10th ultimo, No. 8415, there is herewith forwarded report of work on the

U. S. S. MAINE.

Main frames: From Nos. 68 to 86 and from protective to main decks have been placed in position and riveted.

Superstructure framing: After superstructure framing all complete and being placed in position.

Stem: Has been riveted from berth to main decks.

Stern post: Has been riveted from protective to main decks.

Bilge keel: Calking on bilge keel is all complete.

Outside plating: Two E strake No. 15 plates in position, riveted and calked. Riveting on two each of M strake Nos. 5, 6, and 7, complete. Riveting on two each of N strake Nos. 6, 7, 8, and 9, complete. Riveting on two each of O strake Nos. 1, 2, and 3, complete. Two each of O strake Nos. 4, 14, 15, 16, and 17, in position, riveted and calked. Riveting on two each of P P strake Nos. 1, 2, and 3 is complete. Two each of superstructure No. 19 is in position. Two each of P P strake Nos. 4, 14, 15, 16, and 17, in position and riveted. Two each of P strake Nos. 2, 14, 15, 16, and 17, is in position. All calking on port side has been completed.

Main-deck beams: From frames Nos. 64 to 86 have been placed in position and riveted.

Superstructure deck beams: There are thirteen after and seven forward beams complete and ready for position.

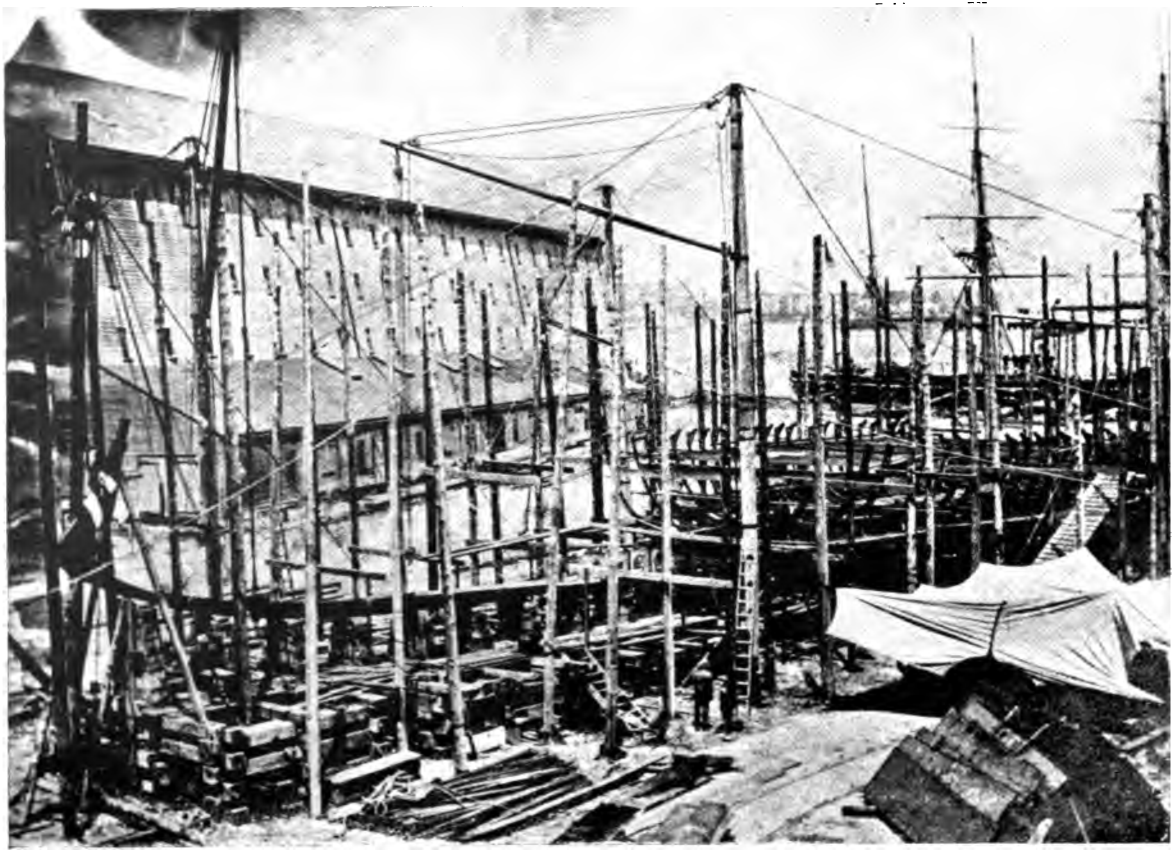
Beams in coal-bunkers: Between frames Nos. 30 and 58 all in position.

Hatch carlings: On berth deck aft of No. 67 and on main deck aft of No. 64 have been completed and riveted.

Wing passage bulk-head: Has been about three-fourths riveted.

Bulkheads (transverse): On frame No. 6 completed to main-deck and riveted; on frame No. 16 completed and riveted; on frame No. 24 the calking is finished; on frame No. 30 the calking is finished; on frame No. 54 about one-tenth complete; on frame No. 58 about one-fifth riveted; on frame No. 67 all riveted and about nine-tenths calked; on frame No. 72 in position; on frame No. 76 in position from protective main decks and has been riveted and calked from platform to berth-deck; on frame No. 81 from protective to berth deck in position and riveted; on frame No. 84 from berth to main deck in position; in coal-bunkers on frames Nos. 35, 41, 47, and 52 have been placed in position; riveting on partial bulkheads between frames Nos. 68 and 69 complete.

Longitudinal bulkhead: Between frames Nos. 21 and 24 calked; between frames Nos. 24 and 30 calked; between frames Nos. 71 and 77 calked. In engine-room about one-fifth complete.



U. S. S. Cruiser No. 7 New York, August 28, 1890.

Shaft alley bulkhead: Complete (except two plates) and riveted.
Coffer-dams: Forward coffer-dam complete and riveted; after coffer-dam one-half complete.
Breast-hooks: Between protective and berth decks and between berth and main decks placed in position and riveted.
Deck plating: Protective (aft) of frame No. 72 riveted and calked; berth (aft) complete and three-fourths riveted; armor berth-deck nine, plates have been removed to make alterations and twenty-two have been put in place. Two-thirds riveted. Main-deck from Nos. 1 to 24 riveted and from frame No. 67 to stern-post placed in position and riveted.
Engineer's store-rooms: Under protective-deck completed and riveted.
Turrets: Forward turret support placed in position; loading hatches (under turrets) are ready for position.
Engine foundation: Three-fourths completed and partly riveted.
Thrust bearings: Complete and riveted.
Boiler saddles: One-half completed and foundation bars riveted.
Air-ducts: In wing passage completed.
Cementing: Complete except above third longitudinal on starboard side.
Sluice valves: On frames No. 18 and 67 complete.
Manhole covers and frames: In water tanks completed and in lower wing passage riveted.
Stanchions: On berth deck forward placed in position and riveted.
Hawse pipes: The four hawse pipes forward are in position and riveted.
Magazine flats: Between frames Nos. 52 and 58 in position.
Distilling room: One platform deck in position.
Hatch frames and covers: On berth deck forward complete and in position.
Water-tight door frames: Are now under way.

About 55 per cent. of the work is completed, not including armor or alterations.

The testing of water-tight compartments is progressing.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD, *New York.*

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-Yard, New York, October 7, 1890.

SIR: In compliance with the Bureau's letter of the 10th ultimo, No. 8415, there is herewith forwarded report of the completed work on the

U. S. CRUISER No. 7.

Keel inside plate No. 1 P.
Outside plating (port): B between frames Nos. 2 and 3 to Nos. 27 and 28; C between frames Nos. 11 and 12 to Nos. 35 and 36; D between frames Nos. 3 and 4 to Nos. 28 and 29; E between frames Nos. 21 and 22 to Nos. 36 and 37; F between frames Nos. 19 and 20 to Nos. 34 and 35; G between frames Nos. 32 and 33 to Nos. 47 and 48; H between frames Nos. 25 and 26 to Nos. 55 and 56.
Outside plating (starboard): B between frames Nos. 2 and 3 to Nos. 27 and 28; C between frames Nos. 16 and 17 to Nos. 35 and 36; D between frames Nos. 3 and 4 to Nos. 28 and 29; E between frames Nos. 21 and 22 to Nos. 36 and 37; F between frames Nos. 19 and 20 to Nos. 34 and 35; G between frames Nos. 27 and 28 to Nos. 47 and 48; H between frames Nos. 25 and 26 to Nos. 55 and 56.
Frames: From Nos. 1 to 22 from keel to protective-deck, also bulk-head frames from shelf to protective-deck Nos. 26, 31, 37, 44, 47, 49, 54, and 66; Z-frames Nos. 41, 48, 50, 51, 52, 53, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, and 68, from shelf to protective-deck frames Nos. 69 to 79 ready to place in position.
Inner bottom plating (in position): I. A. from frame No. 20 to Nos. 26 and 27; I. A. from frames Nos. 31 and 32 to Nos. 61 and 62; I. B. from frames Nos. 48 and 49 to Nos. 66 and 67, port and starboard; I. C. from frame No. 26 to Nos. 55 and 56, port; I. C. from frame No. 26 to Nos. 32 and 33 starboard; I. D. from frames Nos. 50 and 51 to Nos. 55 and 56 port; I. D. from frames Nos. 45 and 46 to Nos. 55 and 56 starboard; I. E. from frame No. 26 to Nos. 52 and 53 port and starboard; I. F. from frames Nos. 45 and 46 to Nos. 58 and 59; I. F. from frame No. 26 to Nos. 31 and 32 port; I. F. from frame No. 26 to Nos. 31 and 32 starboard; I. F. from frame Nos. 46 to 47 to Nos. 58 and 59 starboard; I. G. from frame Nos. 60 and 61 to No. 66 starboard and port.
Beams (protective-deck): From Nos. 1 to 50, and from Nos. 58 to 68 in position.

Hatches (protective-deck): From Nos. 21 to 23, 30 to 34, and 36 to 43, complete.

Gusset plates, attached to Z-bar: Frame on protective-deck and shelf are complete as far as frames are in position.

Deck plating: Four protective-deck plates in position; twenty-three longitudinal bulkhead staples are in position; thirty-six intercostals in engine foundation with plates and angles, on port and starboard side, complete and riveted; eight staples and three plates for thrust bearing on starboard side; transverse and intercostal angles between frames under inner bottom for boiler and saddles complete.

Vertical keel plating: From frame No. 2½ to between Nos. 14 and 15; angles (top) from No. 2½ to between Nos. 19 and 20, and between Nos. 64 and 65 to Nos. 73 and 74, and (bottom) angles from frames No. 2½ to between Nos. 11 and 12.

Longitudinal first: From frames Nos. 5 to 25 port and starboard with angles; plates on top from frame No. 5 to between Nos. 27 and 28 port and starboard.

Longitudinal second: From frames Nos. 5 to 25 port and starboard with angles. Plates on top from frame No. 16 to between Nos. 27 and 28 port and starboard. Vertical angle-clips on vertical keel and longitudinals complete, where specified.

Transverse bulkhead: On frame No. 5, complete and riveted; on frame No. 11, two plates in position; on frame No. 17, three plates in position; four plates in position under magazine and shell flat; two angle bars on margin of shelf from between frames Nos. 56 and 57 to No. 66 port and starboard; alterations on frames Nos. 62, 63, 64, 65, 66, 67, and 68 to receive the sleeves for shafts completed.

Riveting and calking: Outside plating riveted; B to C from frame Nos. 19 to 36 and Nos. 45 to 55; C to D from frame Nos. 21 to 36 and Nos. 45 to 55; D to E from frame Nos. 22 to 36 and Nos. 46 to 51; E to F from frame Nos. 26 to 51; A to B from frame Nos. 23 to 29; B to C from frame Nos. 26 to 36; D from frame Nos. 26 to 36; E from frame Nos. 30 to 57; angles on lower edge of first longitudinal riveted to outside plating from Nos. 26 to 41 starboard; angles on lower edge of first longitudinal on port side from Nos. 19 to 55; angles on lower edge of second longitudinal riveted to outside plating port side from Nos. 22 to 51, on starboard Nos. 30 to 51.

Inner bottom plating: I G, riveted to frames; I A, riveted from frames Nos. 27 to 40; to reverse bars, angles on top of vertical keel and to strake; I B, on both port and starboard sides.

Riveting: On top of vertical keel from No. 2½ to between Nos. 27 and 28, and from Nos. 60 to 66 on bottom from Nos. 2½ to 17; riveting from first longitudinal top from Nos. 5 to 25, and from Nos. 50 to 57 starboard and port; riveting on second longitudinal top Nos. 5 to 35 port and starboard; riveting on bottom of vertical keel through keel-plates from frame Nos. 2½ to 27; angle-clips of frames Nos. 2½ to 25 riveted to vertical keel and frames; angle-clips on first and second longitudinals riveted from Nos. 5 to 25, port and starboard.

Calking outside plating (port): A strake Nos. 29 to 55. C strake lower edge Nos. 20 to 54. C strake upper edge Nos. 26 to 54. E strake lower edge Nos. 30 to 45. E strake upper edge Nos. 41 to 51.

Calking outside plating (starboard): A strake No. 26 to frame No. 32. C strake lower edge Nos. 33 to 40. C strake upper edge No. 26 to 40. E strake lower edge Nos. 37 to 50. Including all butts.

About 15 per cent. of the work on this ship is completed.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY YARD, *New York.*

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-yard, New York, October 7, 1890.

SIR: In compliance with the Bureau's letter of the 10th ultimo, No. 8415, there is herewith forwarded, report of work on the

U. S. S. MIANTONOMOH.

Military masts in position.
Hammock berthing completed.
Railing and stanchions on hurricane-deck all completed.
Stanchions and braces for bridge beams on the hurricane deck completed.
Hurricane deck all completed.
Stanchions on main deck all in position.
Bulkhead in engine-room completed.

Shields for sewerage pipe in coal bunkers completed.
Fire and engine room ventilators completed.
Air-ducts all in position and completed.
Water-tight doors and hatches complete.
Light-boxes in magazine and ammunition rooms completed.
Sea valves all complete.
Three steam and three hand pumps for drainage system in position, with all pipe connections.
Bulk-heads in turrets complete.
Sounding-pipes and sluice-valves complete.
Ports in after turrets complete.
Turret complete except roof.
Port in forward turret, as per original drawing.
Bed for galley complete.
Four blower rooms completed.
Four blowers in position with connection.
Roofs of turrets one-half completed.
Sliding doors on main air-ducts seven-tenths complete.
Hatches on main deck three-fifths complete.
Work on pilot-house one-half complete.
Wells on lower deck complete.

Ninety-five per cent. of the work on this ship is completed.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD, *New York.*

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-Yard, New York, October 7, 1890.

SIR: In compliance with the Bureau's letter of the 10th ultimo, No. 8415, there is herewith forwarded report of work on the

U. S. S. PURITAN.

Plating on main deck taken out and replaced to receive turrets forward and aft.
Beams Nos. 29, 30, 31, 32, 33, and 35 have been removed.
Bulk-head No. 34 from hold to berth deck has been taken out
Bulk-head No. 35 from berth to main deck has been taken out.
Coal-bunker bulk-head from frames Nos. 25 to 35 have been taken out on both port and starboard.
Armor backing bars have been removed and holes plugged.
Blowers in forward hold have been taken out.
Bulk-head aft of engine has been taken out.

This ship is about 25 per cent. completed, but work has been stopped in consequence of the non-delivery of material.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD, *New York.*

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-Yard, New York, October 7, 1890.

SIR: In compliance with the Bureau's letter of the 10th ultimo, No. 8415, there is herewith forwarded report of work on the

U. S. S. TERROR.

FORWARD TURRET.

Long bulk-head from frames Nos. 34 to 41 port completed. Long bulk-head from frames Nos. 34 to 47 starboard completed. Long bulk-head from frames Nos. 40 to 47 port completed. Transverse bulk-head on frame No. 40 port side complete. Transverse bulk-head on frame No. 41 complete. Transverse bulk-head on frame No. 44 port and starboard complete. Transverse bulk-head on frame No. 34 from berth to main deck complete.

Deck beams are all in position.

Berth-deck plating complete.

The track and rack in this turret is complete and ready to receive turret.

Inside and outside shell (bottom course) complete and riveted.

Compartments all riveted.

Wheel track in position.

First course inside shell (with vertical beam) riveted.

Six outside shell plates in position.

Brackets for support of shelving for armor plate in position and riveted.

This turret is about two-thirds finished.

AFTER TURRET.

Transverse bulk-head on frame No. 86 complete. Transverse bulk-head on frame No 89 complete. Transverse bulk-head on frame No. 96 complete. Transverse bulk-head on frame No. 97 and 99 complete. Transverse bulk-head on frame No. 110 complete.

Longitudinal bulk-head between Nos. 89 and 96 on both port and starboard complete.

Beams are all in position.

Berth-deck plating complete.

This turret is about one-half complete.

Work on this turret has been delayed nine months by the non-delivery of three longitudinal girders.

This vessel is about 65 per cent. completed.

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD, *New York.*

OFFICE OF NAVAL CONSTRUCTOR,
SUPERINTENDING HULLS OF VESSELS FOR U. S. NAVY,
Union Iron Works, San Francisco, October 1, 1890.

SIR: I respectfully submit the following report of the condition of work on the hull of cruiser No. 6 at date:

All work has been suspended until proposed changes in hull plans are fully decided upon. The ship has been laid down from lines prepared by the contractors and several detail plans, not likely to be affected by changes in the general plans, have been completed.

Very respectfully, your obedient servant,

F. L. FERNALD,
Naval Constructor, U. S. Navy, Superintending Hull.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief of the Bureau of Construction and Repair.

OFFICE OF NAVAL CONSTRUCTOR,
SUPERINTENDING HULLS OF VESSELS FOR U. S. NAVY,
Union Iron Works, San Francisco, October 1, 1890.

SIR: In obedience to the Bureau's order No. 8414, September 10, 1890. I respectfully submit the following statement as to the condition of work on this date on the hull of the armored coast defense vessel

MONTEREY.

ON STOCKS.

Flat and vertical keels, stem and stern post, rudder, transverse and longitudinal framing, armor shelf, backing plates behind armor, main engine seating, shaft struts, side ram plates, man-hole plates and covers to inner bottom and longitudinals, deck beams and carlins, forward and after flats have been completed.

Outside plating (except doubling plates on bow) has all been fitted and is 90 per cent. riveted and calked.

Inner bottom is completed, except four plates at shaft tubes.

Bulk-heads below berth-deck are all fitted and 90 per cent. riveted.

Bulk-heads above berth-deck are 60 per cent. complete.

Berth-deck stringer is all fitted, but not riveted.

Berth-deck plating is 35 per cent. completed.

Drainage in double bottom is 70 per cent. completed.

Lower course main-deck plating is 80 per cent. in place, all riveted to beams.
Upper course main deck plating is 8 per cent. in place, all completely riveted.

IN SHOPS.

Air ports for superstructure, flush hatch frames for berth-deck, manhole frames and covers for water-tanks, deck lights and coal scuttles, and battle plates for same, hand pumps, drainage valves and pipes, forward turret roller carriage, all water-tight doors, wrought-steel tubes for sea valves in double bottom, berth deck water-tight hatch covers, stearing gear (including engine, accumulator, hand wheels, shafts, etc.), completed and ready to go on board.
All bow doubling plates and 12 main deck plates being drilled and sheared.
Hold, berth-deck, and life-line stanchions about 50 per cent. completed.
Turret rollers are about 98 per cent. completed.
Forty-four gate valves, eight 4-inch drainage valves, twenty ventilation registers, and all details of fresh water, salt water, and oil tanks about 75 per cent. completed.
Steam winch-gipsey and shaft, crank-shaft, eccentrics, connecting-rod, piston, valves, and large gear completed.
Angles for hammock berthing and circular angles for barbette supports, 50 per cent. completed.
Eight hundred and forty-five tons of material have been worked into the hull to this date.

The time of completion of the ship, as far as the hull is concerned, depends principally upon the delivery of the armor; if all the armor is delivered, so as to cause no delay, the ship will probably be ready for her official steam trial by the 1st of October, 1891. Should trial prove successful the vessel can be delivered by December 1, 1891.

Very respectfully, your obedient servant,

F. L. FERNALD,
Naval Constructor, U. S. Navy, Superintending Hull.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-Yard, Mare Island, Cal., October 1, 1890.

SIR: In obedience to order of Bureau of Construction and Repair dated 10th ultimo, No. 8415, I respectfully report the work done since July 1, 1890, on the following vessels, together the with percentage of work now completed and the probable time to complete.

Vessels.	Percentage of work completed.	Probable time to complete.
U. S. S. Alert	90	Completed.
U. S. S. Marion	60	Six weeks.
U. S. S. Independence	Completed.	Completed.

Work done on *Alert:* Repairing magazines, port shutters, flood cocks, pumps, pipes, water-closets; docking, painting bottom three coats, and top sides one coat; repairing blocks and boats; repairing and replacing furniture.
Work done on *Independence:* Putting on weather boarding, calking spar deck, and three seams outside, above water; repairing pumps, pipes, scuppers, sash, and ports.
Work done on *Marion:* Cutting out and renewing ceiling, planking, and batteries; taking down joiner work; repairing masts and spars, boats and blocks; removing and repairing furniture; repairing pumps and valves; docking; renewing portion of copper sheating; repairing bilge.

Very respectfully,

J. FEASTER,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD,
Mare Island, Cal.

COMMANDANT'S OFFICE,
Navy-Yard, Mare Island, Cal., Oct. 2, 1890.

Forwarded to the Chief Constructor.

A. E. K. BENHAM,
Commandant.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-Yard, Mare Island, Cal., September 19, 1890.

SIR: In reply to Bureau telegram of September 12, instant, to furnish a statement of "what tools or machines that were furnished last year are not yet erected in position," I have to report as follows:

The Corliss engine, of 250 horse power, intended to drive the several machine tools, is not yet in place, the work being retarded on the foundation through delay in delivery of material.

The hydraulic accumulator, force-pump, and its other attachments is still in store, as well as the following new machine tools: Large rolls to bend 22-foot plates, rolls 13 feet between standards, cold-cutting saw, horizontal punch, open-side planer, portable bender, surface-traveling crane, and several minor machines and tools.

The foregoing list of tools, not yet placed in position, are a part of those received on requisition for tools to the amount of $100,000; the other tools have been put up temporarily in that wing of the smithery nearest the iron-plating shop, and, as will be seen from accompanying plan, constitute a very satisfactory assortment of tools required for metal-ship building. They are conveniently arranged, easy of access and handling, and the material to be worked by these tools is conveyed by means of a railway track to the present location of the *Monadnock*. The tools that have been temporarily put up consist of one pair 15-foot rolls, one plate-straightener, one Long & Allstatter punching and shearing machine for heavy work, one punch, and one shear for steel up to three-quarter inch thick, one horizontal punch and beam bender, one planing machine to receive 22-foot plates, one angle-bar cutter, two upright drills, and one counter-sinking machine.

This aggregate of tools, with the facilities for bending material, is inferior to no other ship-plant on this coast. With the additional tools to be purchased under act of Congress appropriating $50,000 for that purpose, and the scheme carried out as submitted July 30, 1889, in regard to sheds and other improvements, the ship-plant on this yard would be the most complete in the country for ordinary ship-building and repairing purposes.

The machine tools on hand and ordered will be sufficient to carry on the work, and it is only in the lack of sheds and other facilities that the plant is deficient. The Corliss engine will probably be in working order about March 1.

The work of fitting out the ship-fitter shop with a ground floor has been in progress for some time, but suspended owing to delay of the contractor to furnish material. When these latter improvements shall have been made the lower floor will accommodate quite a number of the larger machine tools on hand in addition to those now in use in the finishing-shop, and the galleries will hold a number of smaller tools such as lathes, emery grinders, and other finishing tools. It is not likely, however, that the ship-fitter shop will be ready for the location of tools until about May or June next.

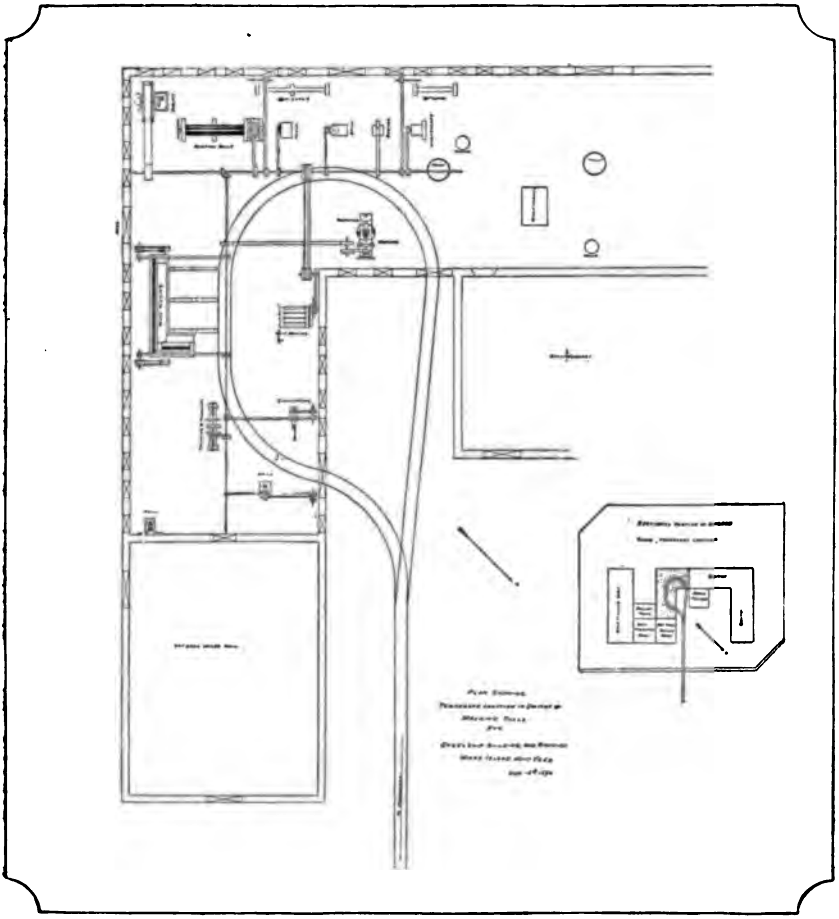
The schedule of material for the engine-house is ready for submittal. The cost of this frame building will aggregate about $7,000, a portion of which will be for the concrete foundation for the engine.

There are now a sufficient number and kind of tools in position to carry on the work upon the *Monadnock* to its completion; except, perhaps, the bar and plate furnaces.

To further improve the plant and have it become what a Government ship-building and repairing establishment should be, I beg leave to recapitulate so much of the "ship-plant report of July 30, 1889," as relates to sheds and other necessary improvements, and I would respectfully recommend that money and permission be granted to start the work upon the following objects:

Alterations and improvements in ship-fitter and finishing-shops, including galleries, offices, and pattern-shop, completion of engine-house	$20,000.00
Two sheds for machine tools, complete with floors, corrugated iron roof, skylights, etc	25,000.00
Racks for stowing plat, bars of every description, beams, etc., and derrick for handling material	10,000.00
Furnaces for bars and plates	10,000.00
Railroad tracks, turn-tables, and trucks	5,000.00
Placing hydraulic accumulator in position and laying pipes to connect tools	5,000.00
Concrete foundation for tools	5,000.00
Boat shed	10,000.00
Total	90,000.00

I have omitted the building slip as recommended in the ship-plant report of July 30, 1889, estimated cost $113,000, for the reason that I believe it to be more important to have the plant proper put in an efficient condition so as to be ready upon receipt



PLAN SHOWING TEMPORARY LOCATION OF MACHINE TOOLS, NAVY YARD, MARE ISLAND.

U. S. S. BENNINGTON.

Boats: 19 per cent. completed since July 1; 1 per cent. remaining to complete on October 1.

Stores not commenced July 1; completed on October 1.

Furniture not commenced July 1; 10 per cent. remaining to complete on October 1. Estimated time to complete, two weeks.

U. S. S. MONONGAHELA.

Work commenced. To complete, three months.

U. S. S. CONSTITUTION.

Docked.

Very respectfully,

JOHN B HOOVER,
Naval Constructor, U. S. Navy.

To the COMMANDANT.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
COLUMBIAN IRON WORKS AND DRY DOCK COMPANY,
Baltimore, Md., October 2, 1890.

Superintending constructor's report of condition of work on Cruiser No. 10, July 1, 1890, with supplementary report showing progress made up to and including the 1st day of October, 1890, with remarks.

July 1.	October 1.	July 1.	October 1.
Vertical keel; all in place.	Nine-tenths completed.	Flat keelson plates; all in yard.	Nine-tenths completed.
Flat keel; all in place....	Nine-tenths completed.	Outside plating; most all in yard.	All in yard and pickled.
Stem; in place............	Nine-tenths completed.	Center line bulk-head; material all in yard, most of it in place.	All fitted below the water-tight deck.
Stern-post	Now in shop and being bored.	Transverse bulk-heads; about half the material in yard.	Are fitted bellow water-tight deck as far aft as frame 72.
Rudder; pattern frame shipped to steel works.	Same.	Water-tight deck; all plates in yard.	Plates fitted as far aft as frame 72.
Transverse frames; material in yard, fifty-eight short Z-bars with floor-plates and reverse angles are in place, much of the other material is bent.	Erected below water-tight deck as far aft as No. 80; all other frames below water-tight deck eight-tenths finished; above water-tight deck six-tenths finished.	Platform deck	Plated as far aft as frame 16.
Deck-beams; water-tight beams are all in yard, seven in place.	Completed and erected as far aft as frame 78; total work on water-tight deck beams eight-tenths completed. Gun-deck beams four-tenths completed.	Girders; all material in yard.	Same.
Poop and forecastle beams; in the yard.	Forecastle deck-beams made and erected as far aft as frame 15. All forecastle and poop-deck beams are fitted and ready for erection except in wake of sponsons. Platform deck-Beams forward are fitted as far aft as frame 16.	Boiler saddle; six in place.	About eight-tenths completed.
Carlings; about seven-tenths in yard.	About four-tenths fitted.	Air-ports; twenty-eight casings, sixteen frames and inside casings, together with much of the work is cast, much of which is finished.	About eight-tenths completed.
Longitudinals; most of the material in yard.	First, fitted as far aft as frame 72; second, as far as frame 69; third, as far as frame 70; fourth, as far as frame 74.	Coaling-scuttles; eight covers and casings about completed.	About nine-tenths completed.
			Riveting is about four-tenths completed on on all work mentioned as fitted.

AMOUNT OF MATERIAL INCORPORATED IN HULL.

Rolled steel, 111,260 pounds.	289,917 pounds.	Steel castings, 5,275 pounds.	5,275 pounds.
Rivets (driven), 1,970 pounds.	9,308 pounds.		

Superintending constructor's report of condition of work, etc.--Continued.

AMOUNT OF MATERIAL ON HAND TO BE INCORPORATED IN HULL.

July 1.	October 1.	July 1.	October 1.
Rolled steel, 732,937 pounds.	808,614 pounds.	Brass castings, 3,297 pounds.	12,382 pounds.
Rivets, 23,717 pounds.	37,390 pounds.	Steel castings.	11,900 pounds.
Cast-iron coal-scuttles, 1,583 pounds.	The same.		

The present condition of the ship shows that seven-twentieths of the contract has been completed.

As regards the time of launching, I would place it at September, 1891, at which time the vessel will be in condition to receive her engines and boilers, and I place the time of her trial trip as July of 1892.

I would say as to progress of work on this vessel, that it is very satisfactory, the principal delay having been caused by the steel works failing to furnish the castings.

Respectfully, your obedient servant,

WM. H. VARNEY, U. S. Navy,
Superintending Constructor, Cruisers Nos. 9 and 10.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
COLUMBIAN IRON WORKS AND DRY DOCK COMPANY,
Baltimore, Md., October 2, 1890.

Superintending constructors's report of condition of work, on cruiser No. 9, July 1, 1890, with supplementary report showing progress made up to and including the 1st day of October, 19, 1890, with remarks.

July 1.	October 1.	July 1.	October 1.
Vertical keel; all in place.	Nine-tenths completed.	Flat keelson-plates; all in yard.	Nine-tenths completed.
Flat keel; all in place....	Nine-tenths completed.	Outside plating; most all in yard.	All in yard and pickled.
Stem; in place	Nine-tenths completed.	Center-line bulkhead; material all in yard, most of it in place.	All fitted below the water-tight deck.
Stern-post	Not received.	Transverse bulkheads; about half the material in yard.	Are fitted below water-tight deck as far aft as frame 72.
Rudder; pattern frame shipped to steel works.	Same.	Water-tight deck; all plates in yard.	Plates fitted as far aft as frame 72.
Transverse frames; material in yard. 58 short Z-bars with floor plates and reverse angles, are in place; much of other material is bent.	Erected below water-tight deck as far aft as No. 80; all other frames below water-tight deck eight-tenths finished; above water-tight deck six-tenths finished.	Platform deck..........	Plating is fitted as far aft as frame 16.
Deck-beams; water-tight beams, are all in yard, 7 in place.	Completed and erected as far aft as frame 78. Total work on water-tight deck beams eight-tenths completed. Gun-deck beams four-tenths completed.	Girders; all material in yard.	Same.
Poop and forecastle beams; in the yard.	Forecastle deck-beams made and erected as far aft as frame 15. All forecastle and poop-deck beams are fitted and ready for erection except in wake of sponsons. Platform deck beams forward are fitted as far aft as frame 16.	Boiler-saddle; 6 in place	About eight-tenths completed.
Carlings; about seven-tenths in yard.	About four-tenths fitted to water-tight deck.	Air ports; 28 casings, 16 frames, and inside casings, together with much of the work is cast, much of which is finished.	About eight-tenths completed.
Longitudinals; most of the material in yard.	First fitted as far aft as frame 72, second fitted as far as frame 69, third as far as frame 70, fourth as far aft as frame 74.	Coaling scuttles; 8 covers and casings about completed.	About nine-tenths completed.
			Riveting is about eight-tenths completed on all work mentioned as fitted.

Superintending constructor's report of condition of work, etc.—Continued.

AMOUNT OF MATERIAL INCORPORATED IN HULL.

July 1.	October 1.	July 1.	October 1.
Rolled steel; 99,522 lbs..	308,526 pounds.	Steel castings, 5,240 lbs..	5,240 pounds.
Rivets (driven); 1,990 lbs.	9,421 pounds.		

AMOUNT OF MATERIAL ON HAND TO BE INCORPORATED IN HULL.

Rolled steel; 668,131 lbs.	718,768 pounds.	Brass castings, 2,734 lbs.	11,448 pounds.
Rivets; 12,434 lbs	37,390 pounds.		
Cast-iron coal scuttles, 1,583 lbs.	Same.		

The present condition of the ship shows that seven-twentieths of the contract has been completed.

As regards the time of launching, I would place it at September, 1891, at which time the vessel will be in condition to receive her engines and boilers, and I place the time of her trial trip as July of 1892.

I would say as to progress of work on this vessel that it is very satisfactory, the principal delay having been caused by the steel works failing to furnish the castings.

Respectfully, your obedient servant,

WM. H. VARNEY, U. S. Navy,
Superintending Constructor, Cruisers Nos. 9 and 10.

OFFICE SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
City Point Works, South Boston, Mass., October 1, 1890.

SIR: In reply to the Bureau's letter of 10th ultimo, No. 8414, I have to submit the below report of the work done on cruiser No. 11 since July 1, last.

Little or no progress has been made on this vessel up to a couple of weeks ago, but since that date material has been arriving, and the work has been pushed. Material is now daily arriving and in a short time I expect decided progress will be made on this vessel.

The plate edges, longitudinals, and decks, have been run in on the mold-loft floor.

The molds for the transverse frames below the water-tight deck have been nine-tenths completed. The molds and templates for the keel-plates, and stem and stern-post have been completed.

The stern pattern has been shipped to foundry, and two castings from it made; the first being condemned, and the second is now under examination at the foundry.

Patterns for the stern-post, struts, and casting to which struts fasten, have been made and shipped to foundry.

The keel-blocks have been laid, and five outer keel-plates (87¼ feet length) have been worked and placed in position on the blocks.

Two hundred short angle bars, forming frame and reverse bars from turn of bilge to vertical keel, have been bent and beveled.

Fifty-five tons of steel angles and 3 tons of steel plates have been received in the yard, and 7 tons plates and 13 tons angles are on the road.

Satisfactory progress is now being made on the working drawings, as the contractor has largely increased his draughting force.

About 2 per cent. of the work required under the contract has been completed, and with so little accomplished, at the present time it is not practicable to name a probable date of completion of this vessel.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief Bureau of Construction and Repair.

Office of Superintending Constructor,
Bath Iron Works,
Bath, Me., October 1, 1890.

Sir: In accordance with Bureau's letter, No. 8414, dated September 10, 1890, relative to progress of work on gunboat No. 6, on October 1, 1890, and probable time of the official trial and final delivery of each of the vessels, I have the honor to report as follows:

	Per cent.
Material worked:	
Drawings	40
Molds	90
Patterns	1
Frames below water-tight deck:	
Bent, punched, and split	90

Material in the yard: All deck planking planed.

Horizontal angles for vertical keel: 500 pounds of red lead, 2 barrels of linseed-oil, 5,000 feet of white pine, 10 carboys acid.

Material ordered and shipped: Water-tight deck beams, double reverse bars, and balance of shapes for vertical keel, flat keelson, floor plates and rivets for same.

Material ordered: Outside plating to gun-deck, frames to gun-deck, all plating shapes and rivets below the water-tight deck. Total amount of plates, shapes, and rivets ordered to date 803,237 pounds—401.5 tons.

In my opinion the probable time of the official trial will be in April, 1892, and final delivery in June, 1892.

Very respectfully,

John B. Hoover,
Naval Constructor, U. S. Navy, Superintending Constructor.

Chief Constructor T. D. Wilson, U. S. Navy,
Chief Bureau of Construction and Repair.

Office of Superintending Constructor,
Bath Iron Works,
Bath, Me., October 1, 1890.

Sir: In accordance with Bureau's letter No. 8414, dated September 10, relative to progress of work on gun-boat No. 5, on October 1, 1890, and probable time of the official trial and final delivery of each of the vessels, I have the honor to report as follows:

	Per cent.
Material worked:	
Drawings	40
Molds	90
Patterns	1
Frames below water-tight deck:	
Bent, punched, and split	90

Material in the yard: All deck planking planed.

Horizontal angles for vertical keel: 500 pounds red lead, 2 barrels of linseed-oil, 5,000 feet of white pine, 10 carboys acid.

Material ordered and shipped: Water-tight deck beams, double reserve bars and balance of shapes for vertical keel flat keelson, floor plates, and rivets for same.

Material ordered: Outside plating for gun-deck; frames to gun-deck; all plating, shapes, and rivets below the water-tight deck. Total amount of plates, shapes, and rivets ordered to date, 803,237 pounds—401.5 tons.

In my opinion the probable time of the official trial will be in April, 1892, and final delivery in June, 1892.

Very respectfully,

John B. Hoover,
Naval Constructor U. S. Navy, Superintending Constructor.

Chief Constructor T. D. Wilson, U. S. Navy,
Chief Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR FOR U. S. NAVY,
Philadelphia, September 3, 1890.

SIR: I have to inform the Bureau that the first delivery of material for armored cruiser No. 2 was made at these works on the 2d inst., consisting of eighteen plates for inner keel and garboard strake.

Very respectfully, your obedient servant,

J. F. HANSCOM, U. S. N.,
Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
DELAWARE RIVER IRON WORKS,
Chester, Pa., October 2, 1890.

SIR: In obedience to the Bureau's letter of September 10, 1890, No. 8414, I have the honor to forward herewith a supplementary report describing the actual condition of work on gunboat No. 3,

CONCORD,

October 1, 1890, showing the progress made since July 1, under the separate paragraphs of specifications that were reported as not being completed in my report of July 26, 1890, No. 529, also the percentage of completed work October 1, with the probable time of the official trial and final delivery of the vessel.

Coal-bunker and other fore and aft bulkheads: Completed.

Water-tight doors: Bulkhead door No. 7, on berth deck, to oil-room to receive lock and stop.

Deck plank: The sectional deck in crew's bag-room made, but not yet in place.

Hammock-berthing, freeing-ports: Completed.

Machine gun and torpedo port shutters: Completed.

Torpedo arrangements: Wood to be fitted over hollow portion of after torpedo tube, in cabin, flush with deck-plank, and fore end of tube filled with wood, with securing rod run through the same; after end of forward tube fitted in the same manner.

Sponsons for guns: Hand-hole covers to be made and secured for hand-holes in gun sponsons on forecastle-deck.

Platforms for guns, hammock hooks, hatch coamings and skylights, gratings and hatch covers, air-ports, ladders (side), sea-steps, etc., awning stanchions, guard rail and stanchions: Completed.

Canopies: Sentry walk canopy frames and stanchions yet to be made and fitted; canopy of engineer's workshop to be fitted to enter in going down the ladder (change of arch).

Ladders to hatchways, etc.: Completed.

Shot-racks and musket-racks: Shot-racks partly made, all to be fitted; musket-racks completed.

Lashing-bolts and shackles for securing guns: Not yet received.

Chocks for fair-leaders, pin-rails, lumber irons, life-buoy guards, brass rubbing-plates, etc.: Completed.

Running-lights: Boxes yet to be made and fitted.

Deck lights: Some of the gun gaskets to be overhauled and made water-tight.

Watch bell, boat davits, and cradles completed.

Galley house, bed, etc.: Brass chain and plug to sink to be fitted; four wire lockers yet to be placed on forward side of after bulkhead of galley room, above the shelf, 24 inches deep, the space athwartships to be equally divided, to be supplied with locks and keys the same as the other lockers.

Bow-stoppers completed.

Steam windlass and capstan: Capstan bars made, but yet to be stowed.

Manger: Key to oil pipe in manger to be supplied and stowed.

Warping-pipes, conning-tower and shield for entrance to same, and wood pilot-house completed.

Steering apparatus: Auxiliary hand-steering, gear over rudder-head to be completed as per contract.

Water tanks: Locks to be supplied to forward berth-deck covers, and lever made and stowed for after tank.

Ash-chutes, coal-scuttles and trunks to coal-bunkers completed.

Passing-scuttles: Wrenches to brass covers to be made and stowed.

Torpedo rooms and torpedo magazines completed.

Ventilation: Exhaust from dynamo room yet to be completed; edges of registers on deck broken, to be renewed; fire-valve rods in wake of bulkheads or where exposed to be cased in with wood or metal casing; forward and after exhaust fans to be covered against the bulkhead, with a hood to prevent back pressure; engines to be overhauled to operate properly; ventilation system to be tested.

Pumping arrangements: Completed, except testing fire system and fresh and salt-water pumping by hand and steam.

Sluice valves, pipes, etc.: All sluice valves to be overhauled and eased; deck brasses of sluice-valves to be marked.

Speaking-tubes and telegraphs: Speaking-tubes from conning-tower to bridge, etc., to complete.

Ward-room: To receive finishing touches of paint, and deck-plank to be scraped and cleaned.

Steerages: To receive finishing touches of paint and deck-plank to be scraped and cleaned.

Chronometer and compass locker: Completed.

Cabins under poop-deck: To receive finishing touches of paint; cabin, state-rooms, berth-deck plank, and wood sections of the passageway to be scraped and cleaned.

Paymaster's office, armory, prisons, master-at-arms locker: Completed.

Signal locker: Made, yet to be secured on the poop deck.

Dispensary, engineer's work shop, pantries, water-closets: Completed.

Firemen's wash-rooms: Chain and plug yet to be fitted; cementing of floor to be repaired and surface painted.

Reels: Completed.

Brass label plates: Made, yet to be fitted over ward-room doors.

Mess and clothes lockers for crew completed.

Eye-bolts in beams completed.

Oil tanks: Valve to be put in main filling pipe near spar deck.

Cleaning, galvanizing, etc., and painting steel or iron-work: This has been done as the work progressed.

Painting, graining, and polishing wood-work: Berth-deck, main-deck, cabin, and ward-room to receive some touching up.

Varnishing decks: Decks are covered with raw turpentine and sawdust.

Electric-lighting apparatus: Search-lights yet to be installed; wiring of bridge to be completed.

Electric call bells: Completed.

Swinging tables and benches for crew: Completed, except table slings to be lengthened one link, so as to be of proper length for seating crew.

Bridge: Wood-work well under way, brass and iron-work yet to be done in accordance with plans and contract.

Forced draught in fire rooms: Kafer system, completed.

Steam engineering: Piping connected with the dynamo engines to be fitted; tachometers to be fitted; new divisions are to be placed in the combustion chambers of boilers; traveler-bars for lifting out evaporators to be fitted.

Ordnance department work: Completed.

The percentage of work completed under the contract is estimated at 97 per cent.

Several preliminary trials have been made in running up and down the Delaware, to test the machinery, and some alterations are now being made to improve it, which it is contemplated will be completed about October 10, 1890, and, if proved satisfactory, will render the vessel ready as soon thereafter as the vessel can be weighted to load-draught for official trial, probably about October 20, 1890, and, if successful, final delivery to the Government about November 1, 1890.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor, U. S. N., Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
DELAWARE RIVER IRON WORKS,
Chester, Pa., October 2, 1890.

SIR: In obedience to the Bureau's letter of September 10, 1890, No. 8414, I have the honor to forward herewith a supplementary report describing the actual condition of work on gunboat No. 4,

BENNINGTON,

October 1, 1890, showing the progress made since July 1 under the separate paragraphs of specifications that were reported as not being completed in my report of

July 28, 1890, No. 534, also the percentage of completed work October 1, with the probable time of the official trial and final delivery of the vessel.

Coal bunkers and other fore and aft bulkheads: Completed.

Water-tight deck: After water-tight hatch covers yet to receive fastenings.

Water-tight doors: One door on bulkhead No. 7 water-tight deck to receive fastenings.

Stanchions under poop and forecastle decks: Three stanchions under poop deck yet to be fastened.

Gutters on main deck: Completed.

Deck plank: Forecastle, poop, spar and berth decks yet to be planed.

Hammock berthing: Bottom boards yet to be painted; eyes for securing gun covering to be fitted.

Freeing ports: Shutters to be hung.

Machine gun and torpedo port shutters: Forward gun and torpedo port shutters yet to be hung and receive fastenings. After gun and torpedo port shutters hung, yet to receive fastenings.

Torpedo arrangements: The shutter for after tube yet to be hinged and receive fastenings; wood to be fitted over hollow portion of after-torpedo tube, in cabin, flush with deck plank, and fore end of tube filled with wood, with securing rod run through the same; after end of forward tube fitted in same way.

Sponsons for guns: The man-hole covers yet to be made and fitted.

Platforms for guns: Wood platforms and iron work for same all made, but yet to be fitted and put in place.

Gun supports: Two iron doors on spar deck made, to be fitted and hung.

Hammock hooks: Made and partly fitted in ship.

Hatch coamings and skylights: Coamings and skylights for engine hatch and galley house yet to be fitted in place, and receive lifting rods; skylights made but not fitted.

Gratings and hatch covers: Completed.

Air-ports: Square air-ports in cabin to receive shutters.

Ladders (side) sea steps, etc.: Completed.

Awning stanchions: Partly made.

Guard-rail and stanchions: Forward stanchion, poop-deck rail, to be braced.

Canopies: Sockets yet to be fitted to ship; frames about one-half made.

Hatch-cranes: After crane made, yet to fitted.

Shot racks and musket racks: Shot rack yet to be made; musket racks made, yet to be fitted.

Attachments for rigging, chain plates, bolts, etc.: Completed.

Lashing bolts and shackles for securing guns: Not yet received.

Chocks for fair leaders: Fair leaders in ship's side for gun and torpedo port lanyards yet to be fitted.

Pin-rails: No pins in place.

Lumber-irons: Not yet made.

Life-buoy guards: Not yet made or fitted.

Brass rubbing plates, etc.: To be placed at heads of ladders and at cleats.

Swinging booms: Brace to be fitted to crotch.

Running-lights: Fittings not yet made.

Deck-lights: Drain-cocks and hooks for tricing up yet to be fitted.

Watch-bell: Made, yet to be fitted.

Boat davits and cradles: After davits made, yet to be fitted; cradles of after boats yet to be fitted and secured.

Galley house, bed, etc.: Sliding iron shutters are fitted to house, but yet to receive glass lights, hooks, all shelving, lockers, coal box, fresh and salt water hand-pumps, sinks, etc., brass chain and plug to sink, and four wire lockers yet to be placed on forward side of after bulk-head of galley house, above the shelf, 24 inches deep, the space athwartships to be equally divided, to be supplied with locks and keys the same as the other lockers.

Coffer-dams: Water-tight covers partly fitted; drain-cocks yet to be fitted; bow-stoppers, hawse-pipes completed.

Steam-windlass and capstan: All secured in place, but capstan-bars not yet made or fitted in rack.

Manger: Yet to be cemented and drain-pipes fitted; key to oil-pipe in manger to be supplied and stowed.

Warping-pipes: After-pipes made, yet to be fitted.

Bill-boards: Completed.

Conning-tower, and shield for entrance to same: Adjustable support for top plate and wrenches for operating yet to be made, fitted, and stowed.

Wood pilot-house: Sections, sills, etc., all made and partly erected.

Steering apparatus: Steering-wheels and stands cast, but yet to be fitted and erected; main steering-rope partly fitted and to be secured; all gearing, shafting, etc., connecting steering-wheels in conning-tower and pilot-house with steam-steering engine yet to be made and fitted; auxiliary hand-steering gear to be completed as per contract.

Water-tanks: To be cemented; man-hole covers made and partly fitted; locks to be supplied to forward berth-deck covers, and lever made and stowed for after-tank.

Ash-chutes: Hoppers yet to be erected.

Trunks to coal-bunkers: Completed.

Shell-rooms: Handles for lifting out loose deck to be fitted.

Fixed-ammunition room: Yet to receive gratings.

Torpedo-rooms and torpedo-magazines: Two shelves to be put in aft; hatches in gun-cotton store-room to receive handles.

Ventilation: Registers to be fitted; the additional ventilation to dynamo-room, as authorized by the Department, about five-tenths completed; fire-valves and rods yet to be fitted; exhaust from dynamo-room yet to be completed; fire-valve rods in wake of bulkheads, or where exposed to be cased in with wood or metal casing; forward and after exhaust fans to be covered against the bulkhead with a hood to prevent back pressure; engines to be overhauled to operate properly; ventilation system to be tested.

Forced draught in fire-rooms: Kafer system completed.

Pumping arrangements: Spanners for hose-valves yet to be made and stowed; all tanks for wash-rooms, water-closets, etc., yet to be made and fitted; all basins in wash-rooms and water-closets, and all sinks, hand-pumps (with the exception of pump in firemen's wash-room), etc., with their necessary pipe connections and plumbing yet to be installed; galvanized iron bath-tub in firemen's wash-room, as authorized by the Department, made, yet to be fitted; all hand-deck pump-brakes, handles, and stands yet to be made, galvanized and stowed; fire-system, fresh and salt water pumping, by hand and steam, to be tested.

Sluice-valves, pipes, etc.: Two overflow-valve connections yet to be made; piping to after magazine flood-cocks to be fitted; all sluice-valves to be overhauled; deck brasses of sluice-valves to be marked.

Speaking-tubes and telegraphs: Mechanical telegraphs about eight-tenths completed; speaking-tubes about eight-tenths completed; helm-indicator about eight-tenths completed.

Ceiling in hold, store-rooms, etc.: Completed.

Ward-room: Joiner-work about nine-tenths completed.

Steerages: Joiner-work about five-tenths completed.

Cabins under poop-deck: Joiner-work about five-tenths completed.

Chronometer and compass-locker: Not yet made.

General and store rooms: Joiner-work about three-tenths completed.

Paymaster's office: Locker yet to be made.

Armory: Joiner-work about two-tenths completed.

Prisons: Iron door to receive hasp and lock.

Master-at-arms locker: Not yet made.

Signal locker: Not yet made.

Rudder mold: Completed.

Dispensary: Sink, drawers, lockers, etc., made, yet to be fitted.

Engineer's workshop: Ladders to be made and erected; work bench and two lockers for machinist tools yet to be made.

Engineer's stores: Two desks to be made and fitted.

Pantries: All joiner-work and plumbing fittings yet to be done.

Water-closets: Yet to receive all necessary plumbing fittings, piping, and joiner-work.

Firemen's wash-rooms: To receive all plumbing fittings, flooring, etc., with the exception of pump.

Lavatories for officers and crew: Yet to receive all plumber's fittings, joiner-work, etc.

Reels: Hawser-reels completed; hose-reels made, but yet to be erected.

Brass label-plates: Made, but yet to be secured.

Mess and clothes-lockers for crew: Made and partly erected.

Eye-bolts in beams: Completed.

Lamp-room: Yet to receive shelving, hooks, etc.; shelves to be covered with zinc and made oil-tight.

Oil-tanks: Made but yet to be secured; piping, valves, etc., for filling tanks yet to be fitted; name-plates to be fitted to each tank; drip-pans to go under each tank.

Cleaning, galvanizing, etc., and painting steel and iron work: This has been done as the work progressed.

Painting, graining, and polishing wood-work: Nothing done yet.
Calking: Decks to be recalked; all decks to be planed.
Varnishing decks: Nothing yet done.
Cement: Tanks, manger, and bottom of hammock berthing yet to be cemented.
Scuppers: Completed.
Electric call bells: Wires about nine-tenths run,
Electric lighting apparatus: Wiring of fire and engine rooms about eight-tenths completed; berth-deck forward, wiring about nine-tenths completed; switch boards, engines, dynamos, search-light section, and all fixtures yet to be installed.
Swinging tables and benches for crew: Made, but yet to be stowed in their places; table slings to be lengthened one link so as to be of proper length for seating crew.
Bridge: Brass and iron work made, but yet to be erected; mahogany beams worked and fitted.
Steam engineering: All work in this department finished, except brick-work in combustion chambers, steam-pipe connections to dynamo engines, and fitting tachometers.
Ordnance department work: Completed.

The percentage of completed work under the contract is estimated at 85 per cent.

After the satisfactory corrections, alterations, and preliminary trial are made on the *Concord*, it is contemplated to make similar alterations to improve the machinery of this vessel, which if proved satisfactory upon preliminary trial, can be done pending the completion of the hull.

Judging by the progress of the work in the past, this vessel will probably be made ready for the official trial about December 20, 1890, and final delivery to the Government about January 1, 1891.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor, U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. Navy,
Chief of Bureau of Construction and Repair.

APPENDIX M.

INCREASE OF THE NAVY.

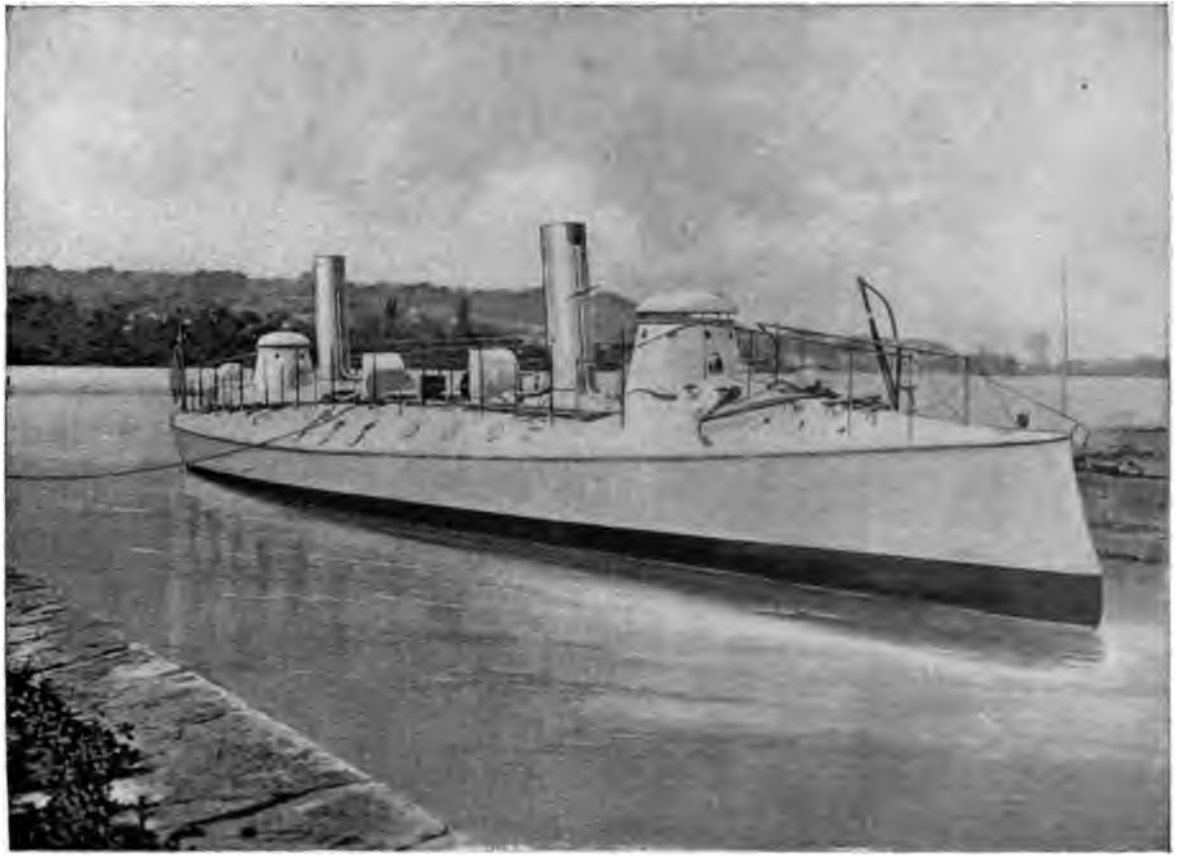
ROACH VESSELS.

The act of March 3, 1883, authorized the construction of the following vessels, known as the Roach vessels:

Chicago, Boston, Atlanta, Dolphin		$4,308,964.41

Appropriations were made for the construction of the Roach vessels as follows:

By act of March 3, 1883		$1,300,000.00
Act of July 7, 1884:		
Bureau of Construction and Repair	$921,500.00	
Bureau of Steam Engineering	620,000.00	
Bureau of Equipment and Recruiting	78,600.00	
Bureau of Navigation	30,000.00	
Bureau of Ordnance	500,000.00	
		2,150,100.00
Act of March 3, 1885 (deficiencies):		
Bureau of Construction and Repair	75,357.23	
Bureau of Steam Engineering	86,983.57	
		162,340.80
By transfer from construction and repair appropriation, by order of Secretary, etc		40,162.61
By act of July 26, 1886:		
Bureau of Construction and Repair	95,861.00	
Bureau of Ordnance	91,137.00	
Bureau of Ordnance:		
Deficiency for gun-carriages and powder	22,000.00	
Deficiency for labor at Washington yard	60,000.00	
Deficiency, freight and material	48,913.00	
Foreign and domestic bills	37,294.84	
Deficiency, existing contracts	83,655.16	
		438,861.00



U. S. S. TORPEDO BOAT CUSHING.

Act of March 30, 1888:		
Bureau of Construction and Repair	$40,000.00	
Bureau of Ordnance	175,000.00	
Bureau of Navigation	2,500.00	
		$217,500.00
Total appropriation for Roach vessels		4,308,964.41

Recapitulation.

Appropriations for Roach vessels by:	
Act March 3, 1883	1,300,000.00
Act July 7, 1884	2,150,100.00
Act March 3, 1885	162,340.80
Transfer from construction and repair appropriation, May 6, 1885	40,162.61
Act of July 26, 1886	438,861.00
Act of March 30, 1888	217,500.00
	4,308,964.41

OTHER VESSELS.

By act of March 3, 1885 (vessels authorized):	
Newark, Charleston, Yorktown, Petrel	1,895,000.00
By act of August 3, 1886 (vessels and monitors):	
Baltimore, Vesurius, Maine, Amphitrite, Texas, Cushing, Puritan, Monadnock, Terror, and $150,000 authorized to be expended on construction plant, navy-yards, New York and Norfolk	2,500,000.00
Armament includes vessels under act March 3, 1885, and *Miantonomoh*	1,000,000.00
By act of March 3, 1887 (gun-boats and cruisers authorized):	
Philadelphia, San Francisco, Concord, and *Bennington*	1,500,000.00
Monitors and vessels authorized March 3, 1885, and August 3, 1886:	
Newark, Charleston, Yorktown, Petrel, Baltimore, Vesuvius, Maine, Texas, Cushing, Puritan, Monadnock, Terror, Amphitrite, and *Miantonomoh*	2,420,000.00
Vessel for coast and harbor defense (*Monterey*)	1,000,000.00
Armament of all of above vessels	2,128,362.00
Armor and gun steel of above vessels	4,000,000.00
By act of September 7, 1888 (construction and machinery):	
Armored cruiser No. 2, protected cruiser No. 6, cruisers Nos. 7, 8, 9, 10, and 11, and all vessels theretofore authorized	3,500,000.00
Steel practice vessel	260,000.00
Armament (for all new ships)	2,000,000.00
By act of March 2, 1889 (construction and machinery):	
Armored steam cruising monitor, dynamite cruiser No. 2, gun-boats Nos. 5 and 6, one ram, and all vessels theretofore authorized	4,055,000.00
Four steam-tugs	140,000.00
Armor and armament for all new ships	2,500,000.00
Testing rapid turret guns and re-enforce cartridges	50,000.00
By act of June 30, 1890 (construction and machinery):	
Three sea-going coast-line battle-ships, one protected cruiser, one swift torpedo cruiser, and one torpedo boat, and all vessels theretofore authorized	5,475,000.00
Armor and armament for all new ships	2,500,000.00
	36,923,362.00

Recapitulation.

Appropriated by	
Act March 3, 1885	1,895,000.00
Act August 3, 1886	3,500,000.00
Act March 3, 1887	11,048,362.00
Act September 7, 1888	5,760,000.00
Act March 2, 1889	6,745,000.00
Act June 30, 1890	7,975,000.00
	36,923,362.00

TOTAL RECAPITULATION.

Amounts appropriated for Roach vessels	4,308,964.41
Amounts appropriated for other vessels	36,923,362.00
	41,232,326.41

Limitation of cost of vessels.

Chicago, Atlanta, Boston, Dolphin	$4,308,964.41
Newark	*1,300,000.00
Charleston	*1,100,000.00
Yorktown	*520,000.00
Petrel	*275,000.00
Baltimore	*1,500,000.00
Vesuvius	350,000.00
Maine	*2,500,000.00
Texas	*2,500,000.00
Cushing	*100,000.00
Puritan, Monodnock, Amphitrite, Terror	*3,178,046.00
Philadelphia, San Francisco	*3,000,000.00
Concord	*550,000.00
Bennington	*550,000.00
Miantonomoh (no limitation).	
Monterey	*2,000,000.00
Armored cruiser No. 2	*3,500,000.00
Protected cruiser No. 6	*1,800,000.00
Cruiser No. 7	*1,100,000.00
Cruiser No. 8	*1,100,000.00
Cruiser No. 9	*700,000.00
Cruiser No. 10	*700,000.00
Cruiser No. 11	*700,000.00
Practice cruiser	*260,000.00
Armored steel cruising monitor	*1,500,000.00
Dynamite cruiser No. 2	450,000.00
Gun-boat No. 5, gun-boat No. 6	*700,000.00
Ram—harbor defense (no limitation).	
Steam-tug	35,000.00
Steam-tug	35,000.00
Steam-tug	35,000.00
Steam-tug	35,000.00
Three sea-going, coast-line battle-ships, not exceeding $4,000,000 each	12,000,000.00
One protected cruiser	2,750,000.00
One swift torpedo cruiser	350,000.00
One torpedo-boat	125,000.00
	51,607,010.41

Total limitation of cost of vessels:		
Roach's vesssels	$4,308,964.00	
Vessels since authorized	47,298,046.00	
		51,607,010.41
Total appropriations:		
Roach's vessels	4,308,964.41	
Vessels since authorized	36,923,362.00	
	41,232,326.41	
Deduct appropriations for armament	14,178,362.00	
		27,053,964.41

FEBRUARY 1, 1890.

Regular appropriation.

Act March 3, 1883:	
Bureau of Navigation	$100,000.00
Bureau of Ordnance	150,000.00
Bureau of Ordnance, Torpedo Corps	50,000.00
Bureau of Ordnance, torpedoes	100,000.00
Bureau of Equipment and Recruiting	800,000.00
Bureau of Construction and Repair	1,100,000.00
Bureau of Steam Engineering	1,000,000.00
Bureau of Steam Engineering, machinery, double-turreted monitors	1,000,000.00
Bureau of Steam Engineering, testing Clark's deflective turrets	20,000.00
	4,320,000.00

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*Exclusive of armament.

Regular appropriation—Continued.

Act of July 7, 1884:	
Bureau of Navigation	$50,000.00
Bureau of Ordnance	75,000.00
Bureau of Ordnance, steel rifled breech-loading guns	51,632.50
Bureau of Ordnance, Torpedo Corps	25,000.00
Bureau of Equipment and Recruiting	400,000.00
Bureau of Construction and Repair	550,000.00
Bureau of Construction and Repair (deficiency)	234,000.00
Bureau of Steam Engineering	500,000.00
	1,875,632.50
Act March 3, 1885:	
Bureau of Navigation	87,500.00
Bureau of Navigation (deficiency)	37,500.00
Bureau of Ordnance	146,000.00
Bureau of Ordnance (deficiency)	50,000.00
Bureau of Ordnance, breech-loading rifled cannon	80,000.00
Bureau of Ordnance, wire-wound gun	4,000.00
Bureau of Ordnance, testing American armor	25,000.00
Bureau of Ordnance, Torpedo Corps	60,000.00
Bureau of Ordnance (deficiency)	25,000.00
Bureau of Equipment and Recruiting	800,000.00
Bureau of Equipment and Recruiting (deficiency)	350,000.00
Bureau of Construction and Repair	1,000,000.00
Bureau of Construction and Repair (deficiency)	450,000.00
Bureau of Steam Engineering	950,000.00
Bureau of Steam Engineering (deficiency)	280,000.00
	4,345,000.00
Act July 26, 1886:	
Bureau of Navigation	83,500.00
Bureau of Ordnance	109,300.00
Bureau of Ordnance, Torpedo Corps	58,500.00
Bureau of Equipment and Recruiting	782,200.00
Bureau of Construction and Repair	900,000.00
Bureau of Steam Engineering	763,000.00
	2,696,500.00
Act March 3, 1887:	
Bureau of Navigation	83,500.00
Bureau of Ordnance	126,400.00
Bureau of Ordnance, naval proving-ground	40,000.00
Bureau of Ordnance, torpedoes	50,000.00
Bureau of Ordnance, Torpedo Corps	57,800.00
Bureau of Ordnance, purchase of *Stiletto*	25,000.00
Bureau of Equipment and Recruiting	625,000.00
Bureau of Construction and Repair	900,000.00
Bureau of Construction and Repair, repairs of several vessels	200,000.00
Bureau of Steam Engineering	675,000.00
	2,782,700.00
Act September 7, 1888:	
Bureau of Navigation	90,000.00
Bureau of Ordnance	253,000.00
Bureau of Ordnance, Torpedo Corps	65,700.00
Bureau of Equipment and Recruiting	625,000.00
Bureau of Construction and Repair	825,000.00
Bureau of Construction and Repair (deficiency)	43,691.25
Bureau of Steam Engineering	605,000.00
	2,507,391.25

Regular appropriation—Continued.

Act March 2, 1889:	
Bureau of Navigation	$106,000.00
Bureau of Ordnance	141,000.00
Bureau of Ordnance, Torpedo Corps	75,000.00
Bureau of Ordnance (deficiency)	2,879.79
Bureau of Equipment and Recruiting	675,000.00
Bureau of Equipment and Recruiting (deficiency)	401,068.69
Bureau of Construction and Repair	1,000,000.00
Bureau of Steam Engineering	605,000.00
Bureau of Steam Engineering (deficiency)	103,046.13
	3,108,994.61
Act June 30, 1890:	
Bureau of Navigation	96,000.00
Bureau of Ordnance	144,000.00
Bureau of Ordnance, Torpedo Station	60,000.00
Bureau of Equipment	910,000.00
Bureau of Construction and Repair	1,000,000.00
Bureau of Steam Engineering	650,000.00
	2,860,000.00

RECAPITULATION.

Act March 3, 1883	4,320,000.00
Act July 7, 1884	1,875,632.50
Act March 3, 1885	4,345,000.00
Act July 26, 1886	2,696,500.00
Act March 3, 1887	2,782,700.00
Act September 7, 1888	2,507,391.25
Act March 2, 1889	3,108,994.61
Act June 30, 1890	2,860,000.00
	24,496,218.36

Improvement of construction plants.

Mare Island, act September 7, 1888	100,000.00
New York, act March 2, 1889	50,000.00
Norfolk, act March 2, 1889	50,000.00
Washington, D. C., act March 2, 1889, to complete gun plant	625,000.00
Portsmouth, N. H., act June 30, 1890	50,000.00
Boston, act June 30, 1890	50,000.00
League Island, Pa., act June 30, 1890	50,000.00
New York, act June 30, 1890	50,000.00
Norfolk, act June 30, 1890	50,000.00
Mare Island, Cal., act June 30, 1890	50,000.00
	1,125,000.00
Washington, D. C., act June 30, 1890, to complete gun plant	145,000.00
	1,270,000.00

NOTE.—In addition to above $150,000 was authorized to be expended on construction plant of New York and Norfolk navy-yards by act of March 3, 1885, and is included in statement of appropriation of $2,500,000 under head of "Increase of the Navy."

Miscellaneous.

Act January 30, 1885 (increase of the Navy):	
Completing U. S. steamer *Mohican*	$50,000.00
Care of monitors (in hand of contractors)	5,000.00
Deficiency act March 3, 1885 (Navy miscellaneous):	
Payment to Harlan and Hollingsworth Company for use of ship-yard and care of monitor *Amphitrite* July 8, 1876, to December 29, 1882	67,987.00
Payment to William Cramp & Sons for use of ship-yard and care of monitor *Terror* July 8, 1876, to December 30, 1882	75,790.00
Payment to John Roach for use of ship-yard and care of monitor *Puritan* July 8, 1876, to December 29, 1882	69,201.00

Miscellaneous—Continued.

Act July 26, 1886 (Navy miscellaneous):	
Pay civilian members Naval Advisory Board 1887	$5,500.00
Deficiency act March 30, 1886 (Increase of the Navy):	
Steel cruisers, Bureau of Construction and Repair (to pay H. Steers for services as civilian member of Naval Advisory Board)	7,291.83
Steel cruisers, machinery, Bureau of Steam Engineering (to pay S. Archbold for services as civilian member of Naval Advisory Board).	5,382.73
Deficiency act October 19, 1888, Navy miscellaneous):	
Payment to William Cramp & Sons for wharfage U. S. monitor *Terror*.	3,352.00
Deficiency act April 4, 1890:	
For boats, blocks, furniture, and cooperage, and for purchase of stores for the new cruisers *San Francisco* and *Philadelphia* and the new gun-boats *Concord* and *Bennington*	50,000.00
	323,478.00

REPORT

OF THE

CHIEF OF THE BUREAU OF STEAM ENGINEERING.

NAVY DEPARTMENT,
BUREAU OF STEAM ENGINEERING,
Washington, October 15, 1890.

SIR: In obedience to your order of the 2d September last I have the honor to submit to the Department the annual report of this Bureau, together with the estimates, for the fiscal year ending 30th June, 1892.

APPROPRIATION, STEAM MACHINERY, 1890.

Amount appropriated for the fiscal year ending June 30, 1890, act approved March 2, 1889		$605,000.00
Expended to October 1, 1890:		
Labor in the navy-yards and stations, in repair of steam machinery, boilers, etc., of naval vessels fitting for sea-service, and preservation of tools, handling and preservation of materials, stores, etc	$384,328.40	
Purchase of materials, stores, machine tools, freight, and incidental expenses	163,075.32	
Payments for repairs, materials, freight, and incidental expenses on foreign stations	43,433.28	
Total	590,837.00	
Less repayments by transfers in the adjustment of appropriations	15,958.11	
Total expenditures		574,878.89
Balance on hand		30,121,11
Obligations of the Bureau to be paid from this balance:		
Approved requisitions unfilled (estimated)	$9,631.27	
Unfilled contracts, orders, and reservations	19,917.91	
Total obligations		29,549.18
Balance remaining to the credit of this appropriation		571.93

GENERAL OPERATIONS OF THE BUREAU.

The Bureau has during the past year prepared the plans and specifications for the motive machinery of the following vessels, with an aggregate I. H. P. of 82,300. Coast-line battle-ships Nos. 1, 2, 3, of about 9,000 tons displacement each; armored cruiser No. 2, of 8,100 tons; protected cruiser No. 12, of about 7,350 tons; protected cruiser No. 6, of 5,500 tons; Ammen harbor-defense ram. Specifications have also been prepared to be followed by bidders who prefer to submit their own plans of machinery.

Many of the details have been drawn for the machinery of cruisers Nos. 7 and 8, as well as the plans for a large amount of auxiliary machinery.

Designs for the new boilers for the *Ranger* have been prepared, and the work of building them will be commenced at the Mare Island navy-yard as soon as the material can be obtained.

New main boilers, which were on hand, are now being placed in the *Lancaster*, together with two auxiliary ones specially designed and built for her.

Four boilers to work under forced draft have been fitted in the *Essex* and the machinery thoroughly overhauled.

One of the main boilers was cut up and removed from the *Minnesota*, piecemeal, by the force on board; in place of it two boilers originally in the *Intrepid* have been placed for auxiliary purposes.

The main boilers have been removed from the *Yantic* and in place of them two other boilers, also removed from the *Intrepid*, fitted; these will be made to work under the Klotz system of induced draft.

Plans and specifications of the machinery for the 9,000-ton ships were sent to twelve firms; of the 8,100-ton ship to six; of the 7,350-ton cruiser to twelve; of the 5,500-ton cruiser to nine. Besides these a number of educational institutions which give instruction in marine engineering have been supplied with plans and specifications of several of the Bureau's designs. The increasing demands for such information can be taken as an evidence of the growth of the marine engineering industry in this country, and the dissemination of similar information should be encouraged as much as possible by the Department.

All this has entailed a great deal of work in the way of designing, drafting, records, correspondence, etc., and could only have been done, as it was, by the constant and unremitting attention of all the officers and employés of the Bureau, often requiring their presence after office hours and on holidays.

It is a matter of pride for the Bureau to be able to state that except for the *Newark*, which has engines very like those for the *Philadelphia*, built by the same firm; *Concord* and *Bennington*, whose engines are copies of the *Yorktown;* and the *Texas*, purchased abroad, all the machinery now building for the Navy is from its designs; and that of sixteen vessels for whose construction bids have been received in the last eighteen months for but two have designs for machinery been submitted by the bidders, and in both these cases the Bureau's designs were adopted; for one of the vessels because the successful bidder had already adopted them, and in the case of the other because the Department's plans throughout were thought enough superior to the bidders' to warrant the construction of the vessel on them, the difference in cost of the vessel entire by the two plans being only about 2 per cent.

WORK DONE ON THE MACHINERY OF NAVAL VESSELS.

The following statement shows, briefly, the nature of the work done on the machinery of all vessels, whether in commission, laid up for repairs, or in ordinary, during the fiscal year ending June 30, 1890, with a few names and particulars brought to later date. The cost of the work, together with that of stores and outfits, will be found in the succeeding tabular statement.

Adams.—Adjusted pistons; overhauled condenser and valves; fitted crank-pin brasses; temporarily repaired cross-tail; patched air-pump and boilers; repaired feed-pump and anchor engine, and made numerous examinations and repairs in engineer and other departments of the ship, incident to service. The vessel was placed out of commission at Mare Island July 31.

Ajax.—Preservation of machinery.

Alarm.—Preservation of machinery. Besides which, the machinery was generally overhauled, tried, and fitted for sea; and in dock February, 1890, all necessary repairs were made to outboard fittings.

Alert.—Made minor repairs to engines and connections; the engineer's force and machine-shop at Honolulu made extensive repairs to boilers, and the navy-yard force at Mare Island made a new cross-head, new piston-rod stuffing-boxes, and overhauled engines generally; also fitted new tubes and several new sheets, braces, etc., in boilers, and put in good condition all the appurtenances. The vessel was placed out of commission at Mare Island February 6, after service of three years, and machinery was tried in July. Ship went in commission 9th October.

Alliance.—Went out of commission August 20 of last year. The Norfolk navy-yard force docked the vessel December, 1889; overhauled and tried all the machinery, and the ship was commissioned anew January 16, 1890. Since then examinations and repairs have been made, incidental to steaming nearly 11,000 miles up to June 30, and shops at Messina, Alexandria, and Colombo, made a few small repairs.

Amphitrite.—The vessel was towed to the Norfolk yard and completed, except as to felting and slight calking of the boilers; she was also docked January, 1890. Since the fitting out there have been the usual means taken for the preservation of the machinery.

Atlanta.—Frequently overhauled main pistons and aligned various parts of the engines; fitted crank-pin brasses; calked boilers and renewed tubes in some; overhauled all pumps, also the steam-launch, gun-training and steering engines, dynamo, ice machine, ventilating and fire-room blowers, etc. The New York navy-yard force fitted magnolia and lubric metal in crank-pin brasses; overhauled main boilers; replaced original propeller, and made other changes. During service with the squadron of evolution made numerous repairs to main and auxiliary machinery, and overhauled outboards in dry-dock April, 1890. Upon return, work was recommended to be done at the Norfolk yard upon pistons, air-pump engines, condensers, and various pipes; boiler-tube sheets to be reriveted and some auxiliary pumps renewed. Ship in continuous commission since July 19, 1886.

Baltimore.—The ship was accepted December 27, 1889; fitted out at the Norfolk yard; commissioned January 7, 1890; docked and tried in April following, since which time numerous minor adjustments, changes, and repairs have been made to engines, boilers, and fittings.

Boston.—Aligned portions of main engines; put in good condition scored crank-pin and brasses; repacked all condenser tubes; repaired pumps of auxiliary condenser, patched boilers, and in dry-dock August, 1889, and April, 1890, put outboards, etc., in good order. The navy-yard force in New York assisted in some of the foregoing matters. Work of various kinds was done upon pumps, filters, heaters, and pipes, ice machine, ash-hoists, air-duct and blowers; auxiliary steam-pipe and traps; sea-valves, tools, capstan; steering and gun-turning engines; steam-launch machinery; engine-room passage, ladders, and floor-plates, leaky compartments and for other parts of the ship. At Gibraltar a machine-shop repaired an auxiliary steam-pipe. After service with the squadron of evolution, besides work of less importance, it was decided to fit new pins in crank-shaft at the New York yard. Ship in continuous commission since May 2, 1887.

Brooklyn.—Before commencing repairs at the Norfolk navy-yard, condition of hull was found such that vessel was condemned to be sold.

Camanche.—Preservation of machinery.

Canonicus.—Preservation of machinery.

Catalpa.—Examination and repairs incident to service as tug at the New York navy-yard.

Catskill.—Preservation of machinery.

Charleston.—The ship was accepted November 7 and commissioned December 26, 1889, after which she was fitted out at the Mare Island yard, propeller blades changed, and numerous minor adjustments made to main and auxiliary machinery, and outboards overhauled in dock March, 1890. The engineer's force made the usual examinations and overhaulings incident to service upon engines and boilers, worked on dynamo engines and on pipes connected with water-distribution of the ship, and did various jobs for other departments.

Chicago.—Overhauled or repaired pistons; starting valves; brasses of crank-shafts, crank-pins, and connecting-rods; condenser tubes; air, circulating, feed, bilge, wrecking, and other pumps; ash-hoist; ventilating, anchor, steering, and dynamo engines; electric search-light gear, steam-launch and whale-boat machinery, distillers, evaporators, and heaters; calked seams, expanded leaky tubes, and made numerous other repairs to the boilers, their valves and pipes, and did work for other departments of the ship. The vessel was in dock August, 1889, and April, 1890. The navy-yard force at New York fitted pipes for the ice machine, and a machine-shop at Rio repaired evaporator coils. Upon her return from service as flag-ship of the squadron of evolution, it was recommended to rerivet some boiler seams, to overhaul braces and tubes and evaporators. In commission since April 19, 1889.

Cohasset.—Examination and overhauling of engines and necessary repairs to boilers; also preservation of machinery when vessel was not in use.

Cushing.—Was placed in commission April 22 and accepted April 26, 1890. Minor overhaulings and repairs have been made incident to trials and service, and outboards, etc., examined while in dock at Boston in August.

Dale.—Repairs have been made, necessary for the maintenance of heaters, pump, and boiler.

Despatch.—Made necessary examinations of and repairs to pistons, main bearings, and pipes; patched and calked boilers, repaired stop-valves and expanded tubes, and repaired steam-launch machinery. Vessel was in dock August, 1889. The navy-yard force in New York straightened bent propeller blades, and in Washington overhauled steam-launch machinery. Ship in continuous commission since June 2, 1880.

Dolphin.—Eased main bearing brasses, overhauled condenser, and made minor repairs to engines and boilers, and to machinery of steam-launch. Shops at Marseilles and Plymouth made small repairs. At the New York yard eased bearings of thrust-shaft, fitted eccentrics, put all pumps in order, fitted a complete set of spare brasses, repaired boiler fittings and steam-launch machinery. The engineer's force also did work for other departments of the ship and on the boilers of the *Yantic*. Vessel was in dry-dock in September, 1889, and June, 1890. In continuous commission since December, 1885.

Emerald.—Made examinations and repairs incident to service at the Portsmouth navy-yard.

Enterprise.—Overhauled pistons, valves, and gear, brasses, crank-shaft bearings, condenser, pumps, boilers, clutch-coupling, and auxiliary machinery, and did work for the ship. In dock March, 1890. The New York navy-yard force aligned pistons, overhauled and tested condenser, repaired main steam-pipe, overhauled main feed and bilge pumps and spare brasses, calked seams, renewed or expanded tubes, and overhauled appurtenances of boilers. Ship was put out of commission May 20, and after being overhauled was recommissioned July 8, 1890.

Essex.—The navy-yard force at New York aligned engines, bored high-pressure cylinder, fitted crank-pin brasses, renewed condenser tubes, overhauled thrust bearing, fitted new boilers and uptakes and a forced-draft system, built bunkers, fitted new auxiliary pumps, and overhauled department generally. Ship was placed in commission April 22, 1890, after which time the engineer's force made repairs incident to service.

Fortune.—Made numerous examinations and minor repairs to engines, boilers, and auxiliary machinery, incident to constant service. The navy-yards at Boston and Norfolk also made small repairs. The vessel was in dock in April, 1890, and has been in commission since March 30, 1887.

Franklin.—The navy-yard force at Norfolk fitted patches and removed many tubes and braces in the boilers used for auxiliary purposes. The small engineer's force attached to the ship overhauled boiler valves, auxiliary pumps, and the machinery of two steam-cutters, and did many jobs for other departments of the ship; also overhauled pistons and other portions of the main engines and took means for preserving the latter.

Galena.—Overhauled main pistons and valves; crank-pins and brasses; crank-shaft bearing; cross-head slippers and brasses generally, condenser; air, circulating, feed, and bilge pumps; boiler tubes, seams, and patches; safety and other valves; piping; steam-launch machinery, and assisted the navy-yard force at New York in work upon reversing gear, valve gear, water-valves, liners for clutch coupling, boiler tubes; outboard valves, auxiliary pump, steam-launch machinery, etc. The engineer's force helped in repairs to the *Yantic* and in other work on the station, and were assisted in their own repairs by the boiler-makers of the *Baltimore*, *Essex*, and *Petrel*. The vessel was docked July, 1889, and was put out of commission at New York July 23, 1890, after continuous service since August, 1880.

Hartford.—Work suspended on the ship; the running parts of the machinery are removed to the shop at the Mare Island yard.

Independence.—The *Trenton's* steam-launch was put in good order for this ship.

Intrepid.—Removed portions of the machinery from the hull, transferring two boilers to the *Minnesota* and two to the *Yantic*.

Iroquois.—The force at the Mare Island yard completed work of fitting the ship for sea, and the engineer's force made the usual adjustments and repairs during service. After the accident to the machinery the navy-yard force repaired damaged piston-rods, etc., and opportunity was taken to patch the boilers extensively. The vessel was in dock July, 1889. Was placed in commission June 19, 1889.

Jamestown.—Repaired and tested boiler and maintained distiller, heaters and pumps.

Jason.—Preservation of machinery.

Juniata.—Overhauled pumps and strainers and did other work until ship went to Portsmouth, where the navy-yard force removed stores, spare parts, instruments, etc. Vessel condemned to be sold.

Kearsarge.—Overhauled main pistons; valve gear; crank-pin and other main brasses; studs of hot-well valves; condenser tubes; main engine pumps; roller thrust bearing; boiler seams and rivets, tubes, valves, cocks, and pipes; auxiliary pumps; anchor engine, and steam-launch machinery, and assisted in repairs to *Yantic's* boilers. The navy-yard force at New York secured thrust pillow block and made brasses for circulating pump engine. Ship in dry-dock November, 1889, and in commission since November, 1888.

Lancaster.—The navy-yard at Portsmouth, N. H., bored cylinders, overhauled main valves; trued pistons and rods; shrunk straps over defective crank; fitted crank-pin brasses; overhauled condenser and air-pump piston; placed new boilers in position and did other work to fit the vessel as a gunnery ship; also put outboards in good order in dock April, 1890.

Lehigh.—Preservation of main engines and boilers, and overhauling steam-launch machinery.

Leyden.—Made examinations and repairs incident to service at the Portsmouth navy-yard.

Mahopac.—Preservation of machinery and special examination of port main piston.

Manhattan.—Preservation of machinery and special overhauling of both main pistons.

Marion.—Overhauled cut-off valves, eccentric straps, and link; fitted crank-pin brasses, and filed pins; scraped and drawfiled forward propeller shaft journal; overhauled reversing engine and gear; expanded tubes or fitted new ones in boilers; calked leaky seams, overhauled boiler valves; repaired pipes, etc. Ship was placed out of commission May 22, 1890, after service of five years and four months.

Mayflower.—Examined outboard valves, etc., in dock October, 1889. Machinery obsolete, boilers condemned.

Miantonomoh.—Fitted turret racks; tubed and packed main and auxiliary condensers; overhauled blower engines, circulating engines, and auxiliary pumps; put in condition all outboards when ship was docked in February, and took means for the preservation of the machinery. The work was done by the force at the New York navy-yard.

Michigan.—Overhauled pistons, follower bolts in air-pump plunger, crank pin brasses, main bearings and paddle-wheels; also the outboards while in dock July, 1889; patched boilers and repaired safety-valve; overhauled steam-launch machinery; repaired piping; did work for other departments, and fitted out for summer cruise. Ship in continuous commission over forty-five years.

Minnesota.—Made incessant repairs to boilers used for auxiliary purposes; cut up one old boiler to make room for two from the *Intrepid*; repaired and ground sea-valves when ship was docked in June; repaired auxiliary pump and overhauled steam launch machinery; also took means for preserving the main engines.

Mohican.—Made examinations, overhaulings and repairs to cylinders, pistons, valve-gear, water-valves, condenser, hot-well relief valves, air and other pumps, safety and blow valves, boiler gauges and stays, steam-launch machinery, anchor engine, ash-hoist, and bilge-strainers. Machine shops at Honolulu and Callao made new piston rings and water-gauge valves, and small details for anchor engine and boilers. Ship in continuous commission since May, 1885.

Monadnock.—Cast and bored several cylinders, their heads, liners, valve-chest liners, etc.; turned several steam-chest covers; faced joints on condensers; planed pillow-block frames, cross-head guides, main brasses, etc.; fitted several connecting and eccentric rods and piston details; planed, fitted, and riveted boiler plates, heads, tube sheets, and connections; drilled tube, rivet, and stay bolt holes, and did other work advancing the machinery towards completion at the Mare Island yard. The vessel was in dock in August.

Monocacy.—Aligned pistons and fitted new springs; overhauled crank-pin and drag-crank brasses, cross-head, air-pump plunger, and eccentrics; calked leaky seams and rivets in boilers and ground stop and safety valves; overhauled auxiliary pumps, heaters and steam-launch machinery; did several jobs for other departments of the vessel, and overhauled outboards in dock, February, 1890. Machine shops at Yokohama and Shanghai repaired heaters, counters and gauges. Vessel in continuous commission more than twenty-two years.

Monongahela.—Patched distilling boiler and made repairs to piping.

Montauk.—Preservation of machinery.

Monterey.—Examination and repairs incident to service as tug at the Mare Island navy-yard.

Nahant.—Preservation of machinery.

Nantucket.—Besides usual means for preservation of machinery, repacked air-pump, disconnected engines from shaft, and relieved stern stuffing-box gland; also overhauled out-boards, etc., in dock, May, 1890.

Nellie.—Removed old boiler and replaced it with two launch boilers; put machinery in good order.

New Hampshire.—Overhauled and repaired steam-heaters and pumps and the machinery of three steam-launches, substituting a new boiler in one and new propellers in the other two; also overhauled pumps, piping, etc., in buildings of the torpedo station, and erected machinery in repair shop.

Nina.—Repaired engine and boiler and put machinery in fair condition; examined out-boards in October, 1889.

Nipsic.—Substituted the *Alert's* propeller for one injured at Apia, reversed lignum-vitæ in stern bearing and overhauled out-boards while on marine railway, September, 1889. Pieced out eccentrics to take up lost motion, and overhauled engines generally; patched boilers and expanded tubes; overhauled pumps and auxiliaries, and made numerous repairs incident to service. Machine-shop at Honolulu made rudder-post and shoe-casting and some minor repairs. Ship in continuous commission since October 10, 1887.

Omaha.—Overhauled main bearings, cross-heads, and cross-tails; air, circulating, bilge, and auxiliary pumps, patched boilers, calked and cemented leaky seams, and expanded leaky tubes; added fittings and made extensive repairs to the machinery of two steam-launches and substituted new boiler in steam barge; overhauled blower, ash-hoist, and capstan engines, distiller, and other details. The Yokosuka Dry Dock Works put outboards in good condition August, 1889; machine shops at Kobe, Yokohama, and Nagasaki repaired bilge, auxiliary, and spare feed pumps, blower engines, launch machinery, and distiller coils, made numerous small fittings for the department, and boys scaled boilers in places inaccessible to men. Ship in continuous commission since April 16, 1885.

Ossipee.—Made numerous minor repairs to engines, boilers, and auxiliary machinery, until vessel was placed out of commission in November, 1889, after a continuous service of nine years and nine months. At the Norfolk yard began work of refitting with new boilers, but this was stopped in consequence of rotten wood being found in ship's frames behind boiler space.

Palos.—Smoothed cracks in crank-pins and fitted brasses; fitted many patches on boilers; renewed or expanded defective tubes; renewed stay bolts; repaired auxiliary pump. Machine shop at Nagasaki fitted new crank-webs and pin, and replaced shaft; fitted main valve and trued piston-follower; repaired eccentrics and straps; cut out tubes and back tube sheets of boilers and fitted new sheets with tubes having tested brazed ends; patched bottoms of combustion chambers; fitted new smoke-pipe, apron and steam drum casing, renewed three outboard strainers, etc., while vessel was in dock October, 1889. After extensive repairs the engineer's force tested boilers, tried engines, and made examinations and overhaulings incident to subsequent service. Vessel in continuous commission since June 11, 1870.

Passaic.—The engineer's force at the Naval Academy made minor repairs incident to service at Annapolis and in steaming to Baltimore and back; also took measures for preservation of machinery when not in use.

Pensacola.—At Norfolk the navy-yard force finished thorough repairs to the machinery; the engineer's force assisted as far as possible and also made adjustments and trials, and in subsequent service on the solar expedition overhauled pistons, fitted new balance-ring on main valve, overhauled reversing engine, pump-valves, and plungers, and steam-launch machinery, and calked slight leaks in boilers. The force at the New York yard made a new valve stem, machined packing rings of main valve, and made some minor repairs. Ship in continuous commission since April 4, 1885.

Petrel.—The vessel was accepted October 18, 1889, and was fitted out at the Norfolk yard with heaters, anchor, and dynamo engines, etc. After casualty to valve gear on trial trip she returned under one boiler, and the same yard made repairs and also filed out scores in crank-shaft bearings, refitted brasses, fitted composition set screw in main propellers, fitted keepers to holding-down bolts, and calked boilers. At the New York navy-yard repaired link bolt of high-pressure valve motion. The engineer's force made examinations, etc., incident to service. The vessel was docked in February and in August, 1890, and was put in commission December 10, 1889.

Philadelphia.—Accepted preliminarily July 15; commissioned July 28, and fitted out at the New York yard.

Phlox.—The engineer's force at the Naval Academy made minor repairs to engine, boilers, and dependencies, incident to service at Annapolis and during numerous trips in Chesapeake Bay, also in towing. Workmen at Norfolk yard overhauled main bearings, outboards, etc., in dock November, 1889.

Pilgrim.—At the League Island yard; no work reported.

Pinta.—The navy-yard force at the Mare Island yard aligned cylinders and shafts; overhauled pistons, valves, journals, and brasses; fitted new surface condenser, outboard delivery, injection, and air pump; modified reversing gear; refitted propeller and outboards in dock September, 1889, and made extensive repairs to boilers, auxiliary machinery, and three steam-launches. Subsequently the engineer's force made the usual examinations and overhaulings incident to service, besides doing work for other departments of the vessel and for the repair shops and other buildings at Sitka. In continuous commission since February 24, 1883.

Portsmouth.—Tested boiler and distiller and put pump in good order; the work was done by the navy-yard force at Portsmouth, N. H.

Puritan.—The force at the New York yard removed two boilers, overhauled portions of main engines, also the forced-draft engine, auxiliary and other pumps, etc., and took means for the preservation of machinery.

Quinnebaug.—Disconnected engine, removed crank-shaft, opened boilers, and took means to prevent deterioration. Vessel ordered to be sold.

Ranger.—Aligned high-pressure piston and cleaned condenser tubes. The Mare Island navy-yard force made repairs to low-pressure piston and other parts of the engine; renewed leaky tubes and socket bolts and did other work upon boilers; refitted auxiliary machinery; overhauled outboards and painted bottom in dock, October, 1889. The force on board reset, adjusted, packed, and made numerous minor repairs upon engines, boilers, auxiliaries, and the machinery of two steam-launches. Afterwards the Mare Island yard made and fitted a new high-pressure cross-head in place of cracked one; made new brasses; refitted wrist pins; repaired reversing shaft; fitted several patches, new tubes, and braces to boilers (part of this was night work); overhauled outboards in dock May, 1890; and the machinery was tried. In continuous commission since January 18, 1881.

Rescue.—Means were taken for the preservation of the machinery, and pump and stores transferred to the *Triton.* Vessel condemned to be sold.

Richmond.—Overhauled pistons, dressed brasses, expanded leaky tubes, calked seams, and renewed rivets in boilers, ground valves and cocks, and made minor repairs to auxiliary machinery, steam-launch, and barge. The force at the Norfolk navy-yard repaired Kingston and main delivery, and overhauled outboards in dock September, 1890, and expended two weeks' labor in overhauling machinery. Ship in continuous commission since January 20, 1887.

Rocket.—The force on board made repairs incident to keeping the vessel always ready as a fire-tug and for other purposes, at the Boston yard. The Portsmouth navy-yard repaired piston and valve gear, aligned crank-shaft, adjusted important bearings, renewed some piping, thoroughly repaired boilers, tried machinery, and overhauled out-boards in August, 1890.

Saratoga.—The distilling apparatus first proposed being omitted, a smaller boiler was fitted for the heaters; afterwards another distiller was put in. The navy-yard at Portsmouth tested the steam-cutter.

Saugus.—Preservation of machinery. Vessel condemned.

Speedwell.—Preservation at the Norfolk navy-yard of all parts of machinery likely to be of use. Overhauled sea-valves, propeller fastenings, etc., in dock March, 1890.

Standish.—The engineer's force improved working of valve gear; refitted crank-pin brasses; moved main shaft ahead a small amount, and made minor repairs incident to service in Chesapeake Bay, assisting vessels, target practice, and instruction of cadets at the Naval Academy under the supervision of engineer officers. At the Norfolk yard the sea-valves, propeller, etc., were put in order in dock October, 1889.

St. Louis.—The League Island navy-yard furnished labor and material necessary in fitting a boiler for heating ship.

Swatara.—Strengthened main steam-pipe; overhauled reversing-engine; cleaned condenser-tubes; calked leaks in all boilers; overhauled valves and gauges, all pumps; the ash, blower, and capstan engines; distiller coil and heater pipes; machinery of steam-cutter; sounding apparatus; magazine cock and other work for ship, and put outboards, etc., in order in dock December, 1889. Machine-shops at Singapore, Hong-Kong, Nagasaki, and Yokohama refitted main pumps with lignum-vitæ; repaired water-valves and steam-pipes, anchor-engine and steam-cutter machinery, and furnished new pump for the latter. Ship in continuous commission since March 1, 1888.

Tallapoosa.—Renewed broken piston-spring; scraped crank pin brasses; renewed defective floats in paddle-wheels; fitted several large patches to boilers and tested the latter; overhauled auxiliary machinery, and made minor repairs for other departments and for steam-launch; and machine-shop at La Boca repaired condenser of the latter. A new air-pump rock-shaft is to be procured on the station to replace broken one. Vessel in continuous commission since January 11, 1886.

Terror.—Preservation of machinery.

Thetis.—The engineer's force overhauled crank-pin journals; dressed low-pressure pin and fitted brasses; overhauled main and thrust bearing and all engine pumps; scaled boilers; repaired auxiliary boilers and overhauled valves and cocks. Rolling-mill in San Francisco made new shaft to replace one the crank-pin of which was probably cracked by the propeller striking ice; the Mare Island navy-yard fitted new shaft, new bushing in low-pressure cylinder; new crank-pin brasses; overhauled slip-joint of main steam-pipe, throttle, main valve-rods and glands and starting valves; planed and scraped slides; tested and retinned condenser-tubes; renewed injection-valves; aligned engines, raising one end of frame; fitted new clutch coupling, thrust-bearing and collars; renewed stern-tube and sleeves and secured propeller; patched main boiler; fitted new tube-sheet in one auxiliary and new tubes and hand-hole plates in both, and overhauled boiler valves and cocks; shifted bulkheads, overhauled distiller and spare main brasses; fitted auxiliary feed-pump and heater-pipes; overhauled steam-winch and details of steam-launch machinery, and ground outboard valves in dock February, 1890. Vessel in continuous commission since January 15, 1887.

Triana.—Minor repairs incident to service as tug at the Torpedo Station, Newport, R. I.; besides which, all sea-valves and the stern bearing were put in good condition in dock March, 1890.

Triton.—Purchased in September, 1889, and refitted to some extent at the Washington and Norfolk yards. Painted bottom and overhauled outboards on marine railway February, 1890. The engineer's force made minor repairs incident to assisting vessels and doing other service in Chesapeake Bay and elsewhere, also as tug and for general purposes at the Washington yard.

Vermont.—Fitted new apparatus for steam-ferry scow and tested boiler; renewed heater-pipes and fittings in library building and sailor's hall; fitted new boiler and other parts in one steam-launch; shifted boilers to new boiler-house; fitted boiler-piping and engine-foundation for electric plant; covered all heater-pipes on board receiving-ship, and made numerous minor repairs incident to heating ship and running ferry-scow, two steam-launches, and other machinery.

Vesuvius.—Accepted May 26, placed in commission June 7, 1890, and fitted out at New York yard. The engineer's force made examinations and overhaulings incident to trials and service.

Wabash.—Made smoke-box and smoke-pipe for one auxiliary boiler and felted the latter; shifted position of other auxiliary boiler; erected coal-bunkers; fitted branch steam-pipes to heaters; calked leaky boiler-seams, renewed leaky rivets, and made many minor repairs incident to heating and pumping purposes and for other departments of the ship.

Wyandotte.—Preservation of machinery; besides which, made special repairs to one of the main pistons; repaired and tested boiler of steam-launch and overhauled engine of same. Machine-shop in Richmond made new section of propeller-shaft and furnished small details for steam-launch.

Wyoming.—The engineer's force at Annapolis made minor repairs incident to service in the practical drilling and instruction of Naval cadets under supervision of engineer officers; also took means for the preservation of machinery when not in use.

Yantic.—Aligned pistons and fitted dowel-pins in rings; chipped counterbore of one cylinder; aligned cross-head and shaft-bearings; packed expansion-joint in main steam-pipe; patched and calked boilers and renewed leaky tubes; reduced hoist of smoke-pipe; overhauled machinery of old steam-launch and tested new one, and overhauled distillers. The navy-yard force at New York patched one boiler, repaired distiller-coil, and made other repairs. At Norfolk the yard force removed propeller and shaft, examined stern-post, lignum-vitæ in stern-bearing and portions of dead wood, aligned shafting and overhauled outboards in dock October, 1889. The engineer's force tested engines and boilers; patched both boilers and cemented one; made general repairs to steam-launch engine, including new piston. Force at New York navy-yard overhauled outboards, etc., in dock June, 1890. Boiler-makers from the *Dolphin*, *Kearsarge*, and *Galena* assisted engineer's force seven days in repairs. Two boilers of the *Intrepid* are to be placed on board. Ship in continuous commission since October 2, 1880.

Yorktown.—Scraped crank-pin brasses; overhauled main journals; restemmed reflux-valve; assisted navy-yard force at New York with outboards August, 1889, and overhauled generally. The New York yard erected machine tools, shafting, and piping; straightened propeller-blades; overhauled feed tank and portions of auxiliary steam-pipe; calked leaky boiler-seams and altered ash-hoist gear. The engineer's force overhauled high-pressure valve and piston, crank-pin and main journals, expanded leaky boiler-tubes; fitted new stay-rods connecting bulged tube-sheets; overhauled department and flushing pumps and fitted up feed-pump; overhauled ash-hoists, distiller and evaporator coils; anchor and steering engines; assisted in repairs to tiller-arms; chipped and filed propeller-blades; packed stern stuffing-box, and overhauled outboards in dock April, 1890. Machine-shops at Malta and Gibraltar made small repairs and navy-yard force at New York repaired boilers and pipes. Ship in first commission since April 23, 1889.

Cost of work done under cognizance of Bureau of Steam Engineering for the fiscal year ending June 30, 1890, upon machinery, boilers, etc., with outfits, stores, etc., of naval vessels.

Names of vessels.	Machinery, boilers, etc.	Outfits, stores, etc.	Total.
Adams	$23.70	$451.81	$475.51
Ajax (and monitors)	....	145.07	145.07
Alarm	2,858.33	57.89	2,916.22
Alert	10,873.19	815.98	11,689.17
Alliance	14,012.10	8,081.92	22,094.02
Amphitrite	845.46	....	845.46
Atlanta	158.04	1,822.41	1,980.45
Armored coast-defense vessel	330.00	....	330.00
Baltimore	11,961.21	9,337.12	21,298.33
Bennington	1,631.55	....	1,631.55
Boston	485.95	2,011.09	2,497.04
Brooklyn	5,745.81	....	5,745.81
Catalpa	1,360.22	....	1,360.22
Charleston	5,453.66	73.35	5,527.01
Chicago	6,829.58	2,392.81	9,222.39
Cohasset	82.63	7.32	89.95
Concord	3,084.00	....	3,084.00
Cruiser No. 7	13,249.19	....	13,249.19
Cruiser No. 8	12,334.95	....	12,334.95
Cruiser, 8,150-ton	2,837.04	....	2,837.04
Cruiser, 7,500-ton	1,499.84	....	1,499.84
Cruiser, 5,300-ton	2,045.27	....	2,045.27
Cruisers, 2,000-ton	1,646.28	....	1,646.28
Cruisers, 1,000-ton	867.53	....	867.53
Cushing	133.39	....	133.39
Dale	560.63	....	560.63
Despatch	894.65	548.24	1,442.89
Dolphin	3,298.96	1,243.78	4,542.74
Emerald	84.61	....	84.61
Enterprise	5,073.44	23.76	5,097.20
Essex	39,149.19	996.28	40,145.47
Fortune	249.24	198.97	448.21
Franklin	1,071.76	1,030.75	2,102.51
Galena	9,804.62	100.89	9,905.51
Hartford	216.51	....	216.51
Iroquois	6,173.32	130.00	6,303.32
Jamestown	399.36	36.32	435.68
Jason	601.93	....	601.93
Juniata	1,552.53	....	1,552.53
Kearsarge	253.57	145.88	399.45
Lancaster	22,943.40	139.31	23,082.71
Leyden	67.72	....	67.72
Maine	776.49	....	776.49
Marion	....	610.32	610.32
Mayflower	56.61	18.18	74.79
Miantonomoh	17,306.74	....	17,306.74
Michigan	80.88	23.43	104.31
Minnesota	115.90	246.23	362.13
Mohican	95.75	4,922.78	5,018.53
Monadnock	101,627.61	....	101,627.61
Monocacy	349.15	1,169.16	1,518.31
Monongahela	44.34	....	44.34
Montauk	798.18	....	798.18
Monterey	1,605.43	....	1,605.43
Nahant	828.97	....	828.97
Nantucket	169.58	....	169.58
Nellie	3,173.75	....	3,173.75
Newark	1,714.22	....	1,714.22
Nina	4,588.01	124.87	4,712.88
Nipsic	477.38	49.95	527.33
Omaha	1,368.21	4,641.10	6,009.31
Ossipee	3,896.94	1,299.87	5,196.81
Palos	5,527.76	408.45	5,936.21
Passaic	173.78	....	173.78
Pensacola	5,746.32	5,042.50	10,788.82
Petrel	11,863.76	6,734.64	18,598.40
Philadelphia	6,180.05	179.25	6,359.30
Phlox	14.30	....	14.30
Pinta	9,631.72	2,993.44	12,625.16
Portsmouth	256.59	32.04	288.63
Practice vessel	330.00	....	330.00
Puritan	4,097.73	....	4,097.73
Quinnebaug	357.58	312.12	609.60
Ranger	7,703.17	174.90	7,878.07
Rescue	67.14	....	67.14
Rocket	1,534.23	81.32	1,615.55
San Francisco	4,632.36	....	4,632.36
Saratoga	3,563.47	....	3,563.47

Cost of work done under cognizance of Bureau of Steam Engineering for the fiscal year ending June 30, 1890—Continued.

Names of vessels.	Machinery, boilers, etc.	Outfits, stores, etc.	Total.
Standish	$311.01	....	$311.01
St. Louis	21.04	....	21.04
Speedwell	55.60	$11.14	66.74
Swatara	688.10	1,932.95	2,621.05
Tallapoosa	207.64	1,509.46	1,717.10
Terror	1,432.67	....	1,432.67
Thetis	10,890.34	....	10,890.34
Triana	3.04	....	3.04
Triton	654.59	122.74	777.33
Vermont	244.89	12.24	257.13
Wabash	12.89	....	12.89
Yantic	2,173.95	493.48	2,667.43
Yorktown	2,330.68	1,791.43	4,122.11
Grand total	412,524.80	64,728.94	477,253.74

PRESENT CONDITION OF THE MACHINERY OF NAVAL VESSELS, WITH THE WORK REQUIRED ON EACH.

The following statement shows the condition of the machinery according to the latest reports, together with the work needed to fit the vessels for efficient sea-service, or to keep them on duty or in readiness during the next fiscal year:

Adams (third-rate cruiser).—In ordinary at Mare Island since July 31. If hull warrants it the engines should be thoroughly overhauled before the ship goes on an extended cruise.

Ajax (single-turret monitor).—In ordinary at City Point, Va. Machinery in fair condition; with present small force it would require about three weeks to get the engines and boilers ready for trial, provided no repairs were made; but for long service, general overhauling would probably be needed.

Alarm (torpedo-ram).—In ordinary at the New York navy-yard. In fair condition, having been overhauled and tried in March, 1890; the work necessary to fit the vessel for sea has been completed.

Alert (third-rate cruiser).—After a service of three years, was placed out of commission February 6, 1890, for repairs, at the Mare Island yard. Is in good condition, engines having been overhauled and boilers repaired and retubed. Ship went into commission 9th October.

Alliance (third-rate cruiser).—Thoroughly overhauled at the Norfolk navy-yard, placed in commission January 16, 1890, and now on the Asiatic station. In good condition, though a crack has been reported in high-pressure cylinder end.

Amphitrite (double-turret monitor).—In ordinary at the Norfolk yard, in good condition; but to get machinery ready for sea, some calking, the felting of boilers and pipes, etc., would be needed, and about sixty days' time.

Atlanta (second-rate partially protected cruiser).—After service of four years on the North Atlantic station and elsewhere, including several months with the squadron of evolution, repairs have been recommended, chiefly upon boilers, and to be carried out at Norfolk yard.

Baltimore (protected cruiser).—Was placed in first commission January 7, 1890. In good condition and detailed to convey the remains of Captain Ericsson to Sweden.

Boston (second-rate partially protected cruiser).—In first commission on the North Atlantic station and elsewhere, including practice with the squadron of evolution. After service of about three years and three months repairs have been commenced, the most important item being to fit new pins in crank-shaft. Repairs to be carried out at the New York yard.

Brooklyn (second-rate cruiser).—At the Norfolk yard, and condemned to be sold in consequence of condition of hull.

Comanche (single-turret monitor).—In ordinary at the Mare Island yard. In good condition, and could probably be made ready for sea in less than one week.

Canonicus (single-turret monitor).—In ordinary at City Point, Va. Engines in fair condition, boilers doubtful. It would require about three weeks with present small force to get the machinery ready for trial; but new boilers and general overhauling would be needed for long service.

Catalpa (tug).—In service at the New York navy-yard The machinery is old, but was in fair condition at last accounts.

Catskill (single-turret monitor).—In ordinary at City Point, Va. Condition of important details good, but no pressure test has been applied to the boilers. With present force it would require about ten days to get the machinery ready for sea.

Charleston (second-rate protected cruiser).—Flag-ship on the Pacific station; in first commission since December 26, 1889. Machinery new and in good condition, but bottom reported foul.

Chicago (first-rate partially protected cruiser).—In commission at New York as flag-ship of the squadron of evolution. Has been in service since April 17, 1889. In good condition except that boilers need some repairs, and other matters should be put in good order simultaneously.

Cohasset (tug).—In service at the training station, Newport, R. I. Engine in fair condition, boiler old.

Cushing (torpedo-vessel).—At the Boston yard. In first commission since April 22, 1890.

Dale (sailing vessel).—Receiving-ship at Washington, D. C. Heaters, boilers, pump, etc., in fair condition at last reports.

Despatch (dispatch vessel).—In commission on special service along the Atlantic coast. Engines in fair condition, but boilers much worn from long use; new ones will soon be necessary.

Dolphin (dispatch vessel).—In continuous commission since December, 1885; present service on the North Atlantic station. Condition of important details good to excellent, but shaft bearings must be raised and hull is somewhat pitted.

Emerald (tug).—In service at the Portsmouth navy-yard; in fair condition at last accounts.

Enterprise (third-rate cruiser).—Placed in commission July 8, 1890, for service on the South Atlantic station, after being overhauled at the New York yard. Engines are in good working order, and boilers fair, though the latter had been in the ship ten years in August.

Essex (third rate cruiser).—New boilers, pumps, an evaporator, etc., were put in at the New York yard, and the engines overhauled. The vessel was placed in commission April 22, 1890, and is en route to the South Atlantic station. She is reported in good condition, though the high-pressure valve is complained of.

Fortune (tug).—In commission on special service along the Atlantic coast. Engines in good condition, boilers fair.

Franklin (old-type frigate).—Receiving-ship at the Norfolk yard. The engines would need repairs to fit them for service. The main boilers have been condemned; those for distilling, heating ship, and other purposes, also the steam-launch, are in fair condition.

Galena (third rate cruiser).—Undergoing repairs at the New York navy-yard, where new boilers are to be fitted.

Hartford (second-rate cruiser).—At the Mare Island yard. Many details of the machinery are removed from the ship; the engines require extensive repairs; new boilers, which are partly constructed, are needed. The cost of fitting the vessel would be about $75,000, and time about five months. No decision has yet been arrived at in reference to repairs.

Independence (sailing vessel).—Receiving ship at the Mare Island navy-yard. The steam-launch is supposed to be in good condition.

Intrepid (torpedo-ram).—The machinery has been removed at the New York yard; two boilers to be placed in the *Yantic* and two in the *Minnesota*.

Iroquois (third-rate cruiser).—In commission on the Pacific station since June 19, 1889. Reported in good condition, but the engines are more than thirty years old and the boilers are weak; machinery has been recently overhauled at the Mare Island yard, where broken and bent pump and piston rods were put in good condition.

Jamestown (apprentice training-ship).—Apparatus for distilling water and heating ship, pumps, and boiler supposed to be in good order.

Jason (single-turret monitor).—In ordinary at the League Island yard. Condition fair, but boilers should be tested. Machinery could be got ready in about twenty days.

Juniata (third-rate cruiser).—At the Portsmouth navy-yard. Condemned to be sold.

Kearsarge (third rate cruiser).—In commission on the North Atlantic station since November 2, 1888. In good condition.

Lancaster (second-rate cruiser) —At the Portsmouth navy-yard, where she is being fitted as a gunnery training-ship. In good condition, the engines having been sufficiently overhauled and new boilers being put in place.

Lehigh (single-turret monitor).—In ordinary at City Point, Va. Condition of all important details good, but boilers should be tested. Could be made ready in about ten days, but for extended service there should be quite a number of repairs made.

Leyden (tug.)—In service at the Portsmouth navy-yard; in fair condition.

Mahopac (single-turret monitor).—In ordinary at City Point, Va. Engines in fair condition, but boilers need overhauling. The machinery could be made ready in three weeks unless serious repairs were determined upon.

Manhattan (single-turret monitor).—In ordinary at City Point, Va. The engines in fair condition, boilers poor. Time required to get machinery ready, about three weeks; but for thorough overhauling three months' time would be required.

Marion (third-rate cruiser).—Undergoing repairs at the Mare Island navy-yard, including a new crank-shaft and general overhauling.

Mayflower (tug).—At the Norfolk navy-yard. Engines obsolete, boilers unsafe; thorough repairs would cost $20,000; new and improved machinery could be obtained for about $30,000.

Miantonomoh (double-turret monitor).—Approaching completion at the New York yard, and in good condition.

Michigan (fourth-rate paddle-wheel steamer).—In commission on the Great Lakes. Engines in good condition; boilers fair, but patched in several places.

Minnesota (old-type frigate).—Receiving-ship for boys at New York. Condition of main engines fair, but the state of the hull would not warrant outlay upon the main machinery. The old boilers have been condemned, and two from the *Intrepid* are being fitted for heating, pumping, and other purposes.

Mohican (third-rate cruiser).—In commission on the Pacific station. Condition of engines good; of boilers fair.

Monadnock (double-turret monitor).—At the Mare Island navy-yard. Construction of engines and boilers well advanced.

Monocacy (third-rate paddle-wheel steamer).—In commission on the Asiatic station. Engine in good condition, boilers and paddle-wheels fair.

Monongahela (store-ship).—At the Portsmouth navy-yard. Being fitted out as an apprentice training-ship. Distiller, pump, boiler, etc., supposed to be in good order.

Montauk (single-turret monitor).—In ordinary at the League Island yard. Condition of machinery fair, but for continuous service the boilers would need repairs and a new base to smoke-pipe. Could be got ready in sixty days.

Monterey (tug).—In use at the Mare Island yard. In fair condition at last accounts.

Nahant (single-turret monitor).—In ordinary at the League Island yard. Condition fair, but the boilers should be tested. Time required to get machinery ready for service, thirty days.

Nantucket (single-turret monitor).—In ordinary at the New York yard. Condition good to fair, but the boilers should be tested. The machinery could be got ready in ten days, but for extended service thirty days would be required.

Nellie (tug).—In use at the Mare Island yard. Engines have been overhauled and two launch boilers fitted.

New Hampshire (old-type frigate).—Receiving-ship for boys at Newport, R. I. Heaters, pipes, steam-pump, and boiler in fair condition.

Nina (tug).—In use at the New York yard. Machinery in fair condition, though boilers are old.

Nipsic (third-rate cruiser).—In commission on the Pacific station Ordered to Mare Island for survey and repair.

Omaha (second-rate cruiser).—In commission on the Asiatic station. Engines in fair condition, but boilers show signs of decay.

Ossipee (third-rate cruiser).—At the Norfolk navy-yard. Engines in fair condition. Boilers condemned; hull not worth new ones.

Palos (fourth-rate gun-boat for coast and river service).—In commission on the Asiatic station. Condition fair to good.

Passaic (single-turret monitor).—In service at the Naval Academy for gunnery drills and for instructions of naval cadets in handling the engines under supervision of engineer officers when steam is used. Machinery could be got ready in six days, but for extended service it would require about two months.

Pensacola (second-rate cruiser).—In commission and en route to South Atlantic station. Machinery in good condition, though boilers show signs of pitting.

Petrel (fourth-rate cruiser).—In first commission on the North Atlantic station. Condition of important details good, improving, or fair.

Philadelphia (first-rate cruiser).—In first commission on the North Atlantic station. Machinery new and in good condition.

Phlox (fourth-rate paddle-wheel steamer).—In service at the Naval Academy. Condition of engine fair; of boiler poor, the latter being about fourteen years old. Overhauling and a new boiler would cost about $6,000, an expenditure which the condition of the hull would not warrant.

Pilgrim (tug).—At the League Island yard. A new boiler would be needed if the condition of the hull warranted one being put in.

Pinta (fourth-rate gun-boat for coast and river service).—In commission on the Pacific station. Machinery in fair condition.

Portsmouth (sailing vessel).—Apprentice training-ship at New York. Boiler, pump, and distiller presumed to be in good condition.

Puritan (double-turret monitor).—Approaching completion at the New York yard, and in good condition. The machinery could be got ready for sea in six months.

Quinnebaug (third-rate cruiser).—At the New York yard; condemned to be sold.

Ranger (third-rate cruiser).—In commission for surveying on the Pacific coast; condition fair, engines having been overhauled, boilers patched, and machinery tried at the Mare Island navy-yard.

Rescue (fire-tug).—At the Washington navy-yard; engines in good condition; boilers fair, but hull poor.

Richmond (second-rate cruiser).—In commission on the North Atlantic station. The engines are in fair condition, but old in type. The boilers are beginning to show signs of weakness.

Rocket (fire-tug).—In use at the Boston navy-yard, and believed to be in good condition, having been thoroughly overhauled last year at the Portsmouth yard.

Saratoga (sailing vessel).—In service as the nautical school-ship of Pennsylvania; heaters, boiler, and steam-launch in good condition at last accounts.

Saugus (single-turret monitor).—At the Washington navy-yard; engines in fair condition; boilers worn out; vessel condemned.

Speedwell (tug).—At the Norfolk navy-yard. New boilers would be needed, and a general overhauling of the engine; but the hull is not worth it and parts of the machinery are to be removed.

Standish (tug).—In use at the Naval Academy for practice in gunnery and in handling machinery, and for other purposes. Machinery in fair condition, but the boilers are eleven years old.

St. Louis (receiving-ship at League Island).—Heating apparatus, boilers, and pumps supposed to be in good condition.

Swatara (third-rate cruiser).—In commission on the Asiatic station. Condition fair; the present shaft has a crack in one of the cranks, and the new shaft sent out has not yet been fitted; two boilers need retubing. Ship ordered to Mare Island for repairs.

Tallapoosa (third-rate paddle-wheel steamer for river service).—In commission on the South Atlantic station. Boilers in fair condition, and engine will be so when new air-pump rock-shaft is fitted.

Terror (double-turret monitor).—At the New York navy-yard. The engines and boilers are in good condition; but to erect turret-turning machinery, fit lagging, provide steam-launch machinery and other details, will require about $10,000 and six months' time; this estimate does not include the cost of pneumatic turning gear for the turrets.

Thetis (third-rate vessel for special service).—In commission on the Pacific coast. Machinery in good condition, having just been overhauled at the Mare Island yard.

Triana (tug).—Special service at the naval station, Newport, R. I. Engines require overhauling and boilers are eleven years old. Extensive repairs are needed.

Triton (tug).—In use at Washington navy-yard as fire-boat and for general purposes. Machinery in good condition, except propeller which is broken.

Vermont (sailing vessel).—Receiving-ship at the New York yard. The apparatus for heating the ship and some buildings at the station, and for running the steam ferry scow, is in good condition; also the steam-launch machinery; the electric-light plant is not yet reported upon.

Vesuvius (dynamite-gun vessel).—In first commission at the New York navy-yard. Engines and boilers in good condition.

Wabash (old type frigate).—Receiving ship at the Boston yard. Auxiliary boilers, pumps, and heaters in good condition. Main engine obsolete and boilers have been condemned.

Wyandotte (single-turret monitor).—In ordinary at City Point, Va. Condition of engines good; of boilers fair, but the latter have not been tested. The machinery could be got ready for trial in about three weeks, but for extended service much longer time would be required.

Wyoming (third-rate cruiser).—In service at the Naval Academy for practical drills and instruction of cadets in handling machinery. Engines are in good condition, though thirty-one years old, and boilers fair, but old. The ship is unfit for sea.

Yantic (third-rate cruiser).—In commission on the North Atlantic station. Engines to be overhauled at the New York yard, and two boilers from the *Intrepid* to be put in place.

Yorktown (third-rate cruiser).—In first commission on the North Atlantic station. Machinery in good condition.

NAVY-YARDS.

The principal work of the Bureau during the past year in the navy-yards has been the construction of machinery for cruisers Nos. 7 and 8, and new boilers for the *Galena* at the New York yard; new auxiliary boilers for the *Lancaster* at the Portsmouth yard; machinery for the *Monadnock*, and a boiler for the *McArthur* at the Mare Island yard; repairs to the machinery of various vessels, as noted; construction of quite a number of shop boilers for other Bureaus at Norfolk and Mare Island; care and repair of shop tools and of the machinery of vessels in ordinary; building steam-cutter engines.

The appropriation for the improvement of machinery plant at the Boston, New York, and Mare Island navy-yards will allow a very good outfit of modern tools to be purchased and the shops put in much more efficient condition than they are at present. It is to be greatly regretted, however, that this appropriation is not sufficiently large to allow the purchase of a 600-ton testing-machine; one in which the members of a marine engine might be tested entire instead of samples of the material, as are relied on at present. The value of a machine of this class, not only to the Government but to the entire community, can not be overestimated, as has been proved in the case of the Emory machine at the Watertown Arsenal, which is in almost daily use testing all kinds of materials of construction. The expenses of such a machine are very small after it is once in place, being merely the pay of an attendant or two. In fact, it may be made almost "self-supporting" by allowing tests to be made for other parties, under proper considerations, and charging the actual cost of making them for the use of the machine. There should be a testing-machine of this power in the navy-yard at New York and another at Mare Island, there being nothing of the sort on the Pacific coast.

A synopsis of the principal work done at the various yards will be found given, together with an account of the expenditures for work other than that done on naval vessels.

PORTSMOUTH YARD.

The boilers have been removed from the *Lancaster*, and others, originally intended for the *Franklin*, got in readiness to replace them. Two auxiliary boilers are also being built for this vessel, but till they are completed and in place the main boilers can not be lowered into the ship. These auxiliary boilers, and, for that matter, all the repairs to the ship, would have been completed long since had it not been for the delay in obtaining a few sheets of boiler-plate. As it is she is three months over time and will not be ready in two more.

A number of steam-cutter engines have been built and fitted in boats.

Small repairs have been made to the machinery of the following vessels: *Juniata*, *Leyden*, *Rocket*, *Saratoga.*

A number of spare parts have been made for the launch at the training station, and a set of forgings and castings made for the cadets at the Naval Academy.

Work for other Bureaus has been done as follows:

Equipment.—Changing piping and testing boilers.

Yards and Docks.—Repairing boilers and buoys; made lathe bed.

Ordnance.—Made grates.

Navigation.—Running *Leyden's* engine.

Construction and Repair.—Repaired boilers, dressed tools, etc.

The expenditures during the year, other than for machinery of naval vessels, were:

Civil establishment	$2,689.03
Office expenses	198.09
Care and handling of stores	233.92
Superintendence of shops and repair of shop machinery and tools	17,451.13
Repair of foundry boilers	243.18
Care and repair of yard steam-launches	228.00
Wages charged to conversion account	524.38
Launch machinery, etc., for Boston yard	1,055.24
Launch machinery, etc., for training station	463.44
Launch machinery, etc., for Naval Academy	674.04
Launch machinery for general purposes	1,988.31
Holidays	126.02
Miscellaneous	1,794.36
Total	27,669.14

BOSTON YARD.

It was remarked in my report for last year that the new vessels, being of steel, would require much more frequent docking than wooden ones; and that it was not likely that the fine stone dry-dock at this yard could remain unused much longer.

This view has been proved to be correct, and an appropriation has been made for new pumping machinery, and also for the improvement of the machinery plant under cognizance of this Bureau, "to put the yard in condition for repairing modern marine machinery with economy and dispatch." It goes without saying that there is no better time for making repairs to a vessel than when she is in dock, and that some of the most important ones can be made then only.

Some of the large machine tools in the shops at this yard are superior to those in any shop in the country, and the appropriation for the improvement of the machinery plant, small as it is, will enable all the shops to be put in condition to do any and all repair work expeditiously and well, provided some of the tools that have been transferred to the Bureau of Equipment be retransferred to this Bureau. No better mechanics can be found in any city in the world than in Boston, and their number is sufficient for all the needs of the Government. All the materials used in the building or repair of marine engines can be obtained in unlimited quantities and at lowest rates.

In view of the foregoing I recommend that this yard be again used as a general repair station and that the shops be at once put in order for this purpose.

Slight repairs have been made to the machinery of the *Boston*, *Yorktown*, *Fortune*, *Wabash*, and *Rocket*.

The following work has been done for other Bureaus:

Yards and Docks.—Fitting steam piping; repaired boiler.

Construction and Repair.—Repaired tanks of tug *Rocket* and boiler of dry-dock engine.

The expenditures during the past year other than for work on naval vessels are as follows:

Office expenses	$152.39
Care and handling of stores	710.15
Care and repair of shop machinery and tools	5,492.70
Care and repair of yard steam-launches	3,132.39
Running, firing, and care of yard engines and boilers	819.81
Holidays	135.64
Miscellaneous	229.25
Total	10,672.33

NEW YORK NAVY-YARD.

Overhauling, preservation, and repair work has been done to the machinery of the following vessels; when the repairs have been extensive the principal items are given:

Essex. New boilers (on hand) to work under forced draft have been fitted and the machinery generally overhauled. *Galena.* New boilers are in course of construction and the engines being thoroughly overhauled. *Boston.* The crank shaft is being removed preparatory to having two new pins fitted, after which it will be replaced; the machinery will also be thoroughly overhauled. *Yantic.* Two boilers from the *Intrepid* are being fitted with Klotz's system of induced draft and machinery overhauled. *Triana, Minnesota, Pensacola, Dolphin, Terror, Kearsarge, Lancaster, Despatch, Nantucket, Quinnebaug, Yorktown, Baltimore, Alarm, Nina, Petrel, Puritan, Vermont, Chicago, Fortune, Miantonomoh, Galena, Atlanta, Boston, Brooklyn, Catalpa, Portsmouth, Cohasset, Enterprise.*

Machinery has been built for and set up in several steam cutters.

A house has been completed on the floating derrick to protect the hoisting machinery from the weather and a steam capstan erected on board. This derrick has proved itself so indispensable a tool, and its services are sometimes engaged so far in advance, that it may be questioned if it would not be well to procure another and smaller one to lift and handle, say, 10 or 12 tons, and lift and sustain 25, for ordinary work.

Excellent progress has been made with the machinery for *cruisers Nos. 7 and 8*, and the work will bear comparison with that done in any establishment in the country. If there is no delay in obtaining material, notably steel forgings, castings, and boiler-plate, the machinery will be completed in ample time for the vessels. The Bureau takes pleasure in calling attention to the fact that not a single one of the large and intricate castings for the cylinder casings was lost, nor one for the cylinder linings and valve-chest bushings, than which no better proof can be given of the skill and care with which they were molded. In making similar castings some firms have been so unfortunate as to lose one-half of them.

The new boiler shop has been nearly completed to about half the length shown in the design for it, and most of the heavy tools moved in. A hydraulic flanging machine, with the necessary accumulator and pump, has been procured and is set up and in working order. With part of the same appropriation for improvement of machinery plant at this yard, a hydraulic riveter and an overhead traveling crane will be obtained and the shop will then be in condition to perform any work that may be required of it.

The original plan contemplated a wing to the present machine-shop building to be used for an erecting shop. I recommend that this be built, the heavier machine tools moved into it, an erecting bed built in it, and an overhead traveling crane provided capable of handling the heaviest parts. At present there is a wooden shed to serve temporarily in which the machinery for *cruisers Nos. 7 and* 8 is being set up.

Besides this wing, I recommend that the boiler shop be extended and made of the dimensions designed for it, and further additions made to complete the quadrangle. All the shops of the Bureau, except the foundry, would then be under one roof and could easily be connected by railways, enabling work to be done more expeditiously and cheaply than at present. The same appropriation for the improvement of machinery plant will go far towards placing all the shops in a thoroughly efficient condition.

The work done for other Bureaus is as follows:

Construction and Repair.—Made a large number of castings in iron and brass for ships and shops; repaired shop boilers.

Yards and Docks.—Made castings for various purposes; repaired boilers.

Equipment—Repaired yard boilers; refitted and altered dynamo piping on *Chicago*, *Pensacola*, and *Yorktown*; made repairs to galleys and new pipes for same; made various small castings, mostly in composition.

Ordnance.—Small repairs to boilers; made oil tests.

Provisions and Clothing.—Overhauled boilers and engines; repaired elevator, heaters, shafting.

The expenditures, other than for work done on the machinery of naval vessels, are as follows:

Civil establishment	$5,599.83
Office expenses	395.82
Care and handling of stores	4,053.73
Superintendence, care, and repair of shop machinery, and tools, firemen, coal, etc	37,249.48
Improvement of plant, with new tools, etc	33,294.39
Repairs and maintenance of steam floating derrick	5,067.60
Care and repair of yard steam-launches	461.32
Boilers and machinery for launches for general service	4,685.96
Experimental and test purposes	2,492.80
Breaking up old material	1,362.68
Shipments	2,580.71
Electric-light plant on cob-dock	1,090.41
Holidays	3,817.88
Miscellaneous	382.87
Total	102,535.48

LEAGUE ISLAND YARD.

This yard has not been used for general naval purposes for several years, and no work has been done there except such as found necessary for the preservation of machinery in shops and in vessels laid up.

The following which appears in my report for last year is repeated:

It is earnestly recommended to complete the shops at this yard, and fully supply them with tools of late design and of power to handle the heaviest marine-engine work.

With the new type of machinery being introduced in the Navy the facilities possessed by this Bureau at Portsmouth, New York, and Norfolk will soon be found insufficient, and in case of an emergency entirely inadequate. It is proposed to add to them by completing the shops in this yard, because of all places on the Atlantic coast the Delaware River is the best adapted for iron and steel ship-building; and board after board, appointed to select a place for a naval establishment "for the construction of iron vessels, iron armor, and iron work of every description for naval purposes," has chosen League Island as the best site. Among its advantages the following are some of those enumerated in the report of the Commission on Navy-Yards in 1883:

The neighborhood abounds in skilled labor in all that pertains to building modern ships of war, and is in the vicinity of unlimited supplies of coal and iron. A fine fresh-water basin for the preservation of iron vessels laid up "in ordinary" may be secured by dredging out the back channel. Dry-docks may be constructed there in number sufficient for the prospective demands of the Navy. The neighborhood of the iron ship-building yards belonging to private parties, and the large machine-shops to be found on the Delaware, would enable the Government to avail itself of their services in case of sudden emergency demanding a large amount of extra work.

Nowhere else are so many advantages to be found, and there is no reason why the Government should not avail itself of them.

The machine-shop of this yard is limited in area, but contains some excellent tools of moderate size. For modern boiler work there are no facilities, and in the foundry, castings of 5 or 6 tons weight only can be made. To render the yard efficient, therefore, there should be added a boiler-shop and foundry supplied with modern tools and appliances.

The expenditures during the year, other than those for work done on naval vessels, are as follows:

Care and preservation of machinery and tools	$14,326.94
Care and repair of launch machinery	50.77
Total	14,377.71

NORFOLK NAVY-YARD.

During the past year the machinery of the *Alliance* was thoroughly overhauled and put in condition for sea service; the *Baltimore* was fitted out; the valve gear of the *Petrel* was repaired and partly renewed; the sea valves and stern bearing of the *Standish* were repaired.

Minor repairs were made to the machinery of the following vessels or stores and outfits prepared for them: *Amphitrite*, *Atlanta*, *Brooklyn*, *Despatch*, *Franklin*, *Fortune*, *Jamestown*, *Lancaster*, *Mayflower*, *Ossipee*, *Pensacola*, *Phlox*, *Passaic*, *Portsmouth*, *Speedwell*, Monitors at Richmond, *Triton*, *Yantic*.

Machinery was completed for the Pensacola navy-yard launch and the commandant's barge. Machinery for several steam-cutters and whaleboats was also completed. Many of the power tools in the machine, pattern, and boiler shops and foundry were overhauled and repaired; the new copper shop was fitted up and new and old tools erected in it. The boiler settings were renewed or repaired where found necessary.

The following work was done for other Bureaus and stations:

Naval Academy.—Made castings, air ducts, cylinders, and pulleys for smithery and flasks for foundry.

Training Station.—Fitted up 8 by 8 launch engine to drive shop.

Construction and Repair.—Built three boilers for saw-mill; repaired anchor engine on *Alliance*.

Yards and Docks.—Repaired dry-dock boilers; made new pipe connections to timber dry-dock boilers; made castings for locomotive and railway; repaired boilers.

Equipment.—Fitted dynamo plant and piping on *Baltimore* and *Petrel*.

The buildings are not well arranged for modern shop practice. An erecting shop with an overhead traveling crane is needed, and the heavier tools should be moved into it.

Norfolk possesses special advantages as a repair station, for the mildness of its climate enables outdoor work to be carried on the whole year; the harbor is never blocked by ice; materials of all descriptions can be easily procured; skilled labor is becoming more and more plentiful each year, and the yard is easy of access. A large ship-building establishment is also in course of erection at Newport News, distant but a few miles.

The expenditures, other than for repairs to machinery of naval vessels, were as follows:

Civil establishment	$1,299.95
Draughting	1,685.34
Office expenses	1,019.40
Care and handling of stores	2,587.99
Superintendence	5,399.10
Care and repair of shop tools and additions to same	13,384.95
Running, firing, and repairing yard engines and boilers	4,980.70
Care and repair of machinery of yard launches	1,520.00
Making and repairing launch engines and boilers for general service	15,212.98
Material and labor for other bureaus or departments	10,875.84
Tests and trials of machinery and materials	1,826.11
Holidays	1,562.88
Miscellaneous	2,688.36
Total	64,043.60

WASHINGTON NAVY-YARD.

The only work done here has been preservation and care of plant and machinery and slight repairs to *Despatch*, *Rescue*, *Dale*, *Triton*, *Saugus*, *Fortune*, and *Cushing*.

Expenditures during the year, other than for work done on naval vessels, are as follows:

Office expenses	$45.64
Care, preservation, and handling of stores	2,401.66
Care and repair of yard steam-launches	68.73
Moving and shipping machinery	591.81
Tests of machinery and boilers	85.63
Holidays	85.84
Work for Bureau of Steam Engineering	900.04
Total	4,179.35

PENSACOLA NAVY-YARD.

No work has been done here except care of plant.

Expenditures (nothing for ships) have been as follows:

Civil establishment	$999.98
Superintendence	876.00
Care and repair of shop tools	1,666.84
Running, firing, and repairing yard-engines and boilers	440.51
Care and repair of yard steam-launches	297.94
Total	4,281.27

MARE ISLAND YARD.

Very good progress has been made on the machinery of the *Monadnock*. The keelsons on which it is to be set up are in place in the erecting shop and a temporary traveling crane erected overhead.

Very extensive repairs have been made to the machinery of the following vessels, the important items only being enumerated: *Pinta:* The machinery thoroughly overhauled and new surface condenser made; renewed back-sheets of back connections and retubed boilers. *Thetis:* Machinery generally overhauled; new crank-shaft made; new stern-tube fitted; new clutch fitted on propeller shaft; repaired main and rebuilt auxiliary boilers. *Ranger:* General overhauling of machinery; made new condenser-head; rebraced boilers. *Iroquois:* New piston-rod; circulating and feed pump-rods for after engine; considerable patching done to boilers. *Alert:* General overhauling of machinery; new cross-head made; new steam-pumps put in; renewed back connections and tube-sheets in three boilers; retubed and rebraced all boilers. *McArthur:* Made new boiler, steam-drum, etc., and placed them in the ship. *Nelly:* New boilers fitted and machinery overhauled.

The following vessels had small repairs made: *Monterey*, *Lively*, *Albatross*, *Patterson.*

The spare parts needed for the *Charleston* were made and the machine tools set up on the vessel and engine fitted to drive them.

A number of cutter engines were made and fitted in the boats for which intended.

Many of the shop tools were thoroughly overhauled and special tools for work on the *Monadnock's* engines made; also lengthened the annealing furnace; repaired many of the foundations and renewed underground steam-pipes.

The work done for other Bureaus is as follows:

Construction and Repair.—Built tubular boiler 60 inches diameter by 16 feet long, with steam drum, complete in every particular, for sawmill and one of same size and type for joiner-shop; rim for *Ranger's* capstan; canopy; patterns; pulleys; bevel gears; hawse pipes, etc.

Yards and Docks.—Made two fire-box boilers with smoke-pipes for sectional dock; one cylindrical boiler for joiner-shop; repaired boiler for pile-driver; made patterns for shear legs; screw, nuts, and guides for shear scow; castings for ranges; repairs to dry-dock gates, rock crusher, etc.

Equipment.—Overhauled and repaired galleys for *Hartford*, *Independence*, *Ranger*, and *Pinta.*

Made pelorus-stand and Flinders bars for steering compass; drilled beams and bulkheads for search-light wires; tapped holes for covering and stuffing boxes; made connections and ran wires for search-light on *Charleston;* made new steel crank and piston-rod for dynamo engine and repaired old rod; set up sounding machinery on same ship; repaired binnacle lamp and lanterns.

Repaired reeling-in engine of *Iroquois.*

Ordnance.—Altered magazine lamps, repaired gun-carriages, drilled holes for securing guns and gun circles on *Charleston*, and made bolts.

The appropriation for the improvement of the machinery plant at this yard will procure a very good outfit of modern tools for the boiler-shop and place the whole steam-engineering department in a much more efficient condition.

Expenditures other than for repairs to machinery of naval vessels.

Civil establishment	$1,400.00
Draughting	1,500.00
Office expenses, messengers, writers, etc	2,124.47
Care and handling of stores	2,528.70
Superintendence	5,036.68
Care and repair of shop machinery and tools and additions to same	40,695.33
Improvement in plant	8,949.16
Running, firing, and repairing yard engines and boilers	6,742.40
Care and repair of yard steam-launches	1,322.13
Launch engines and boilers for general service	7,803.46
Making stores for issue	10,519.63
Holidays	2,729.89
Work for other bureaus or departments	3,151.29
Miscellaneous	4,780.48
Total	99,283.62

NAVAL ACADEMY.

Repairs have been made to the vessels and launches attached to the station.

There have been no expenditures other than for work done to the machinery of naval vessels.

NAVAL STATION, NEW LONDON, CONN.

Nothing has been done at this station except the work necessary for the care of material.

The expenditures have been:

Miscellaneous	$706.38
Care and repair of steam-launches	311.02
Total	1,017.40

NAVAL STATION, KEY WEST, FLA.

There has been no work done at this station except preservation and care of stores and machinery.

PERSONNEL.

The Engineer Corps.—In my former reports this subject has been dwelt on at some length, as it was deemed one of the most important with which we have to deal. It is with regret that I have now to report that matters are now in still worse condition than they were a year ago, and that troubles that were mentioned as likely to occur are already apparent, for the number of engineer officers now in the service is not sufficient for the proper performance of the duties required of them. All that I have heretofore said can be repeated with emphasis, but in this report I shall only call attention to a few of my former recommendations in connection with what will now be presented.

The number of engineer officers on the active list is (at the date at which I write) 202, 4 of whom were appointed from naval cadets on July 1, 1890. Among these 202 are 4 who have sent in their resignations, to take effect at the end of leave; 3 are on sick leave, and 1 on leave and engaged in private affairs. Deducting these there remains a total of 194, of whom 4 have not had the proper engineering education, and 2, at least, did not wish to be appointed in the Engineer Corps.

When my last report was published but one ship, (the *Yorktown*,) with modern machinery had been commissioned; since then, three others (*Baltimore*, *Charleston*, *and Philadelphia*) have been placed in regular service, each with one to two less engineer officers than they should have for safety and efficiency, and less than they would have if the corps was sufficiently large to permit the proper detail, but still more than will be possible when the number in the corps has been reduced to the legal limit of 170. As had been foreseen, the worry and anxiety undergone by these officers in their endeavors to keep things going and in order, with the insufficient number of trained men at their disposal, has proved too much for some of them and they are breaking down. A policy which leads to such results can only be productive of disaster to the service. It requires a very simple calculation to show that the present legal numbers in the Engineer Corps will not be sufficient to properly officer the ships now in commission and those for whose construction appropriations have already been made, and this without taking into account the number required for shore duty and to provide for sickness and an occasional leave, etc. Something must be done and done promptly, or we shall not only have some serious break-down to repair which might have been avoided, but also an accident more than likely to be attended with loss of life.

We not only need a very much larger number of officers in the Engineer Corps, but we also need a very much better course of instruction for the young men who are each year appointed into it. It is sometimes asserted that educated engineer officers are not needed for sea duty; that practical mechanics can do the duty just as well. Such statements can only be made by the assurance of ignorance. To separate the sea and shore duties of the Engineer Corps into two distinct branches will entirely destroy the excellent system which is the result of years of experience and trial, and which this Bureau has always claimed as best for the efficiency of the Navy—that is, the combination of the designer, builder, and competent user of machinery; for it is only by the actual working of the machinery at sea that many defects, either in design or construction, become apparent, and it is only when the experience gained by careful supervision and observation is afterwards intelligently applied to other designs that the same or similar defects are avoided and improvements introduced. No better proof of this is needed than is shown in the case of two new ships added to one of the great transatlantic lines. The original intention was to have them precisely alike, but one is completed some time before the other and makes two or three trips, and immediately the chief engineer points out an improvement that can be made in some detail or some arrangement, and the dock (or superintending) engineer of the line directs it made in the sister ship. When the second vessel comes out she invariably "breaks the record" of the first one. Now, both the superintending and the chief engineer referred to have climbed up to their positions by means of the engine-room ladder. "Practical mechanics" would have kept everything in good order and perhaps have improved the adjustment of the parts; to have improved the economy of the system, by which alone any appreciable increase of speed and decrease of running expenses could be obtained, would not have occurred to nor have been understood by them. It is a very simple thing to make a design, but to say which parts of that design shall stand and which be altered to insure desired results requires the skill and training and experience of the engineer.

There is still another and very important point that is generally overlooked when considering the Engineer Corps of the Navy, and that is that they are a part of the military organization and second to none in importance. In the naval battle of the future the engineer staff will have a difficult and important part to perform, and if there is failure in the engine-room no amount of skill and bravery on the bridge may suffice to avert disaster. Celerity of movement has decided many a naval battle and will decide many more, and the celerity of movement of a modern ship depends directly on the skill of her engineer officers.

I must again call attention to the desirability of abolishing the steerage. The existence of this apartment with the stagnation of promotion in the corps keeps the assistant engineers from the enjoyment of those privileges of privacy and comfort to which their length of service entitles them. Existing law and regulations are such that some officers escape with but one cruise in the steerage, but it is a rare case that an assistant engineer is so fortunate.

It was with great pleasure that I read a report from the commanding officer of one of the new ships, an officer recognized as one of the ablest in the service and one fully abreast of the times, wherein was advocated the abolition of the steerage on much the same grounds as urged in my report last year. I am satisfied that it is the almost unanimous opinion of the most progressive officers of all corps that there should be a single mess for commissioned officers below command rank. There is nothing whatever against it except "there has always been a steerage." In the Army, wherever there is a regimental mess, we do not find second lieutenants in a smaller and more uncomfortable apartment, but as fully members of the mess as are the field officers.

The change would require very little readjustment of quarters, and in two ships, *Alert* and *Ranger*, it has been made, and we hear nothing of any deterioration of discipline in consequence.

During the last winter a bill was introduced in the Senate by Senator Butler, S. No. 2779—and in the House of Representatives by Mr. Bingham, H. R. No. 8794—which, in my opinion, fully provides for the needs of the Engineer Corps, as I have now and hitherto enumerated them. The interests of the Government, are carefully guarded, as only capable young men can be appointed, and the increased expense is but trifling. It is much to be regretted that no action has yet been taken on this important measure, for its great value to the Navy and country at large will be shown by even a short trial. Too much credit can not be given the promoters in Congress of this measure to improve technical education in the country and increase the supply of trained and educated engineers on whom the country may call in time of emergency, and I respectfully urge the Department to give this bill its cordial approval and support.

As the duties of the Engineer-in-Chief frequently call him away from Washington, leaving behind a large amount of technical work, it is, in my opinion, desirable that he should be provided with an engineer assistant who would in his absence be responsible for the work of the Bureau. The necessity for such an assistant has been recognized in the case of the Bureau of Medicine and Surgery, the chief of which is allowed by law an assistant selected from the medical corps of the Navy. I earnestly recommend that steps be taken to secure, in like manner, an assistant to the chief of the Bureau of Steam Engineering.

The Engineer Force.—In regard to the enlisted men of the engineer force there is need of prompt and appropriate action fully as much as in the case of the officers. I have, in previous reports, made recommendations for a course of training for these men and insisted on the necessity for it, but experience has proved that the statements as to its importance should have been made earlier and very much stronger, for constant complaints are received from the new ships of the insufficient numbers and incompetency of both petty officers and men of the engineer force.

The principal reason for this is that the men are, without any preliminary training or experience, suddenly called on to perform duty under entirely different conditions from those to which they have been accustomed, and while we have training-ships and systems and schools for instruction in gunnery, seamanship, torpedoes, to suit the new condition of things, we have none for men of the engineer force, and this in spite of the well-known fact that on a modern vessel "steamanship" is of as much importance as any of them; and I have no hesitation in predicting that in future operations on sea the "man with a shovel" will be found as important a factor as he is now recognized to be in operations on land.

It has sometimes occurred to me that perhaps it might be better to take new men and accustom them to forced draft from the beginning, that having no previous experience they might not feel the nervousness that older hands invariably betray when they first try to adapt themselves to the new order of things; shut up in an air-tight box, the air they breathe forced in by a blower, and then made to nearly work their lives out tending fires driven by an air pressure of a couple of inches of water. I doubt if one who has not been in the fire-room of a modern ship during a trial can fully understand what forced draft means, nor how necessary it is that the men who are to work there should be so familiarized with their surroundings that they almost cease to notice them; otherwise their nerves are at such tension that so little a thing as the bursting of a gauge glass or even a strange noise may create a panic.

It seems evident that there is but one thing to be done, get the best men we can and train them for the work they have to do. This can be done in one, and only one way—by actual experience and hard work on a naval vessel with modern machinery and forced draft. They should be comparatively young, not only to insure their being in full possession of bodily strength, but also that they may have as little as possible to unlearn (if such a thing is possible), and not be possessed with the idea that they know more than their instructor.

As to the petty officers, we can not teach them their trades, but only how to make those trades useful on board ship. Previous experience at sea is of course desirable, but should not be deemed indispensable when enlisting men of this class; but no one should be enlisted or appointed a petty officer who can not show to the satisfaction of an engineer officer, regularly appointed to conduct the examination, that he is thoroughly competent to perform all the different classes of work embraced in his trade. Promoting a man on board ship to be a petty officer because he is a "handy man" who can chip and file a little and use a soldering iron is altogether wrong; even if such men managed to get along fairly well on the older vessels (as some of them doubtless did), the moment they are sent to a modern one they become worse than useless, for they can not do the work of a skilled mechanic, but they count as one in the complement and so prevent a better man being sent.

As training-ships for both petty officers and firemen, I recommend that one of the vessels of the *Miantonomoh* class be used on each coast and their regular engineer force increased by as many supernumeraries as may be thought advisable. Then the vessel should be kept under way as much as possible and *always* under moderate forced draft. For ordinary cruising but a part of the boilers need be used, but the invariable rule should be that the fire-rooms are to be closed when the engines are running, and the men put on watch in sufficiently small numbers at a time to give them plenty of hard work to keep up steam whether one, two, or any number of boilers are in use. The petty officers can be acquiring experience at the same time and taught their naval duties. After the petty officers and firemen have become proficient, a part of them can be transferred to cruising ships, where they will form the nucleus of an efficient force, and their places on the training-ship taken by new men. This plan will require the expenditure of considerable coal, but the experience and training given the men, and the good this experience and their example will do to others, is out of all proportion to the cost. I believe that a plan about as outlined above is perfectly feasible and will be productive of the very best results, and that to inaugurate it and carry it out only the co-operation of the Bureau of Navigation and consent of the Department will be necessary. Besides the good results at once apparent it will furnish a reserve of trained men to be called on in time of need.

It is also recommended, as before, that on ships fitted with forced draft all the cruising be done under it till the firemen are thoroughly accustomed to it and can get the full power out of the boilers; after this, cruising might be done under natural draft, except occasionally for purposes of drill, a part of the boilers should be driven under forced draft. By this means we will obtain an efficient fire-room force for each ship in whom dependence can be placed in time of need. Moreover, unless the forced draft arrangements are occasionally used they will be found, like everything else left unused on board ship, out of order when most wanted, and it would have been better to have devoted the space and weight they take up to something else, as well as to have saved the great cost of them.

Besides the main engines, each ship now has a large number of auxiliaries, which are ordinarily complete engines, with all the parts of the large ones, and require fully as much care to insure their proper working. They are, of necessity, often placed in dark corners difficult of access, in remote parts of or entirely outside the engine space. They are generally of the best workmanship, very finely adjusted, and require for their proper care the attention of a skilled mechanic; similar machinery on shore is always in charge of regularly licensed stationary engineers. On ship, they are under the immediate care of men with the rate of oiler, and unless we wish to educate these men on our most expensive machinery, it must be done on a training-vessel. The extent to which auxiliary machinery is now employed is well illustrated in an article on "Naval Training," lately published by Admiral Luce. In this article the admiral states that to take a modern ship to sea the services of but two men are necessary on deck; one at the lead and one at the steam-steering wheel.

The duties of the water-tenders are also much more exacting than they were formerly, so much so that excellent men who formerly held the rate are now unwilling to take it and prefer positions with less pay and less responsibility. Formerly, when the water-tender went on watch, he set his check valves, got the fires cleaned, and then took things easy. Now he is chasing around the fire-room from the time he comes on till he goes off and hardly has time to set one valve before it is time to alter another, and the worry and anxiety is more than any man not possessed of more than an ordinary share of grit and nerve can stand.

Blacksmiths and coppersmiths must also be added to the engineer force on all the new vessels if that force is to be thoroughly efficient. The blacksmith is perhaps the most generally useful mechanic on board ship and the one whose services are always in demand. He makes and repairs most of the tools used by the others, and it would be simply impossible to carry on work of any consequence in the engine department without the forge being set up and in use. The ship's blacksmith will have all he can do without being called on for work below, which, by the way, is of an entirely different class, as different as ship carpentry and pattern making, though both done by workers in the same material.

It needs but a glance at the great tangle of copper piping, miles in length, of all sizes and shapes, on all modern ships, to recognize the necessity of having a coppersmith allowed in the engineer force, and I earnestly request that the rate be re-established and allowed on all the new ships.

To sum up, the whole matter we need more men in the engineer force; of these men a very much larger percentage must be skilled mechanics than formerly was necessary; we must establish a proper training system for them, and offer many more inducements for the better ones to remain in the service. All this was referred to in my report of last year, which will bear reperusal; everything there said is repeated with emphasis.

As there appears a singular lack of information on the subject, I will append a statement showing the number of men in the engineer departments of several large steamers of various transatlantic lines, the list containing six twin-screw vessels and two with single screws, and I. H. P. ranging from 6,500 for one single-screw ship (less than the *Baltimore*, *Charleston*, *Newark*, *Philadelphia*, or *San Francisco*, all of which have twin-screws and a much greater number of auxiliaries) to 20,000 for some of the twin-screws. It should also be remembered that the force on these ships is composed largely of picked men, for one who does not give satisfaction to the chief engineer is put on shore on arrival at the home port, with no more formality than paying him his wages. Besides this, the force is employed in the engine-room and on engine-room work only, and the men are never called off or their work interfered with by drills, exercises, or routine of any kind, except an occasional fire drill. When port is reached after a run, all the help needed from a machine-shop is furnished at once, without requisitions or surveys, on the authority of the superintending engineer of the line. That such a condition of affairs should exist in any navy, or that any navy could exist under it, is of course utterly impossible; and because it is impossible a greater number of men are required on a man-of-war than on a merchantman to do the same work.

I find in my list, which will no doubt cause considerable surprise, but may be relied on as correct, that on one ship there is a chief engineer, 18 assistant engineers for main engines, 7 assistants for the auxiliary machinery, 9 water-tenders, 36 oilers, 1 store-keeper, 54 firemen, 54 coal-heavers; total, 180.

On a sister ship the numbers in some of the above rates are slightly greater, the total number being 189, of whom 120 are firemen and coal-heavers.

Another and smaller vessel carries 1 chief engineer, 14 assistant engineers for main engines, 2 assistants for auxiliaries, 12 cadets or apprentices, 9 water-tenders, 6 oilers, 54 firemen, 54 coal-heavers; total, 152.

A very similar ship has slightly different numbers in some of the rates; the number of firemen and coal-heavers is 113, and the total number is 144.

Another ship has 1 chief engineer, 16 assistant engineers for main engines, 6 assistants for auxiliaries, 2 store-keepers with 2 assistants, 24 oilers, 6 leading stokers, 60 firemen, 42 coal-heavers; total, 159.

A sister ship carries 102 firemen and coal-heavers and a total number of 149.

The single-screw ship of 6,500 I. H. P. has 66 firemen and coal-heavers, and a total number of 89.

Another single-screw ship of more than double this power carries a total number of 133; of these 15 are engineer officers.

The first two vessels in the list have about the same power as designed for cruiser No. 12; the next two about the same as cruiser No. 6; the smaller of the single-screw ships less than the *Charleston*, which has twin-screws and twice as many engines to look after. The average number of officers and men in the engineer's force of the first two ships on the list is 184; on the third and fourth, 147; on the seventh, 89; total, 420; and these are the numbers of officers and men necessary for the engine-room complements of the three cruisers referred to according to merchant service allowance.

Where assistant engineers are mentioned in the complements of the various vessels it means assistant engineers in the regular line of promotion, who, if they remain long enough in the lines and prove competent, will in time be chief engineers of ships. Cooks and mess-men are not included in the total numbers. The ships are of three nationalities and belong to five lines.

COIL BOILERS.

Though several makers signified their intention of submitting boilers of this type for test in compliance with the Department's circular of the 2d August, 1888, but two, William Cowles, of New York, and Charles Ward, of Charleston, W. Va., complied with the conditions and prepared their boilers for trial. Both of these were tested by a board of which Chief Engineer Charles H. Loring, U. S. Navy, was president, and the results obtained are of the greatest value not only to the service, but to the engineering world as well, since they were the most severe and the most carefully made of any of which we have knowledge, and have established a standard which future boilers must equal or surpass to be considered.

Both boilers were given two trials of twelve hours each under forced draft, the air pressure being equal to 2 inches of water. One boiler was set up in a compartment to represent a closed fire-room and the other was fitted for closed ash-pit draft, the choice of methods being left to the maker.

During the trials frequent observations were made of the dryness of the steam as well as of the various temperatures and quantities usually noted in boiler tests; and it is believed that nothing was omitted that could in any way have added to the accuracy of the results obtained or to the completeness of the information to be derived from them.

Not only the steaming qualities of the boilers, but also the facility with which repairs could be made to them, in a space representing the fire-room of a ship, was determined. Full accounts of both will be found in the reports of the board, copies of which will be appended.

As a result of these trials, it was determined to place boilers of the Ward type in the *Monterey*, as they best filled all the conditions required, and a contract has been made for them.

The decrease in weight for a given power is but one of the advantages to be gained from the use of coil or tubulous boilers, though this alone would warrant their being used. Another and very important advantage in favor of employing them in war ships is that from the small quantity of water they contain and the perfect circulation, steam can be raised in a coil boiler, without injury, in a very much less time than in one of the locomotive or Scotch type, even though the latter be fitted with mechanical devices for forcing the circulation. With a coil boiler all the time necessary is that required to start and build up the fire, say half an hour, with soft or semi-bituminous coal. This point was kept steadily in view when it was decided to adopt boilers of the coil type for three-fourths the power of the *Monterey*, for the service she is to perform (coast defense) will require her to be ordinarily at anchor or under easy steam; if she is under way, with the two Scotch boilers with which she is provided in use, she can attain a speed of about 10 knots; this can be increased to 16 in a half hour by firing up on her coil boilers. Or if she is at anchor with no steam at all, or only sufficient to run the dynamo-engine and other auxiliaries in constant use on a modern ship, she can in an emergency be under way and running at a speed of 14 to 15 knots half an hour after fires have been started in the coil boilers. To keep a ship with ordinary boilers in such readiness as this would be simply impossible unless she happened to be near a coal supply, for the fires would require to be kept so heavily banked that the supply in her bunkers would soon be exhausted.

Coil boilers are cheaper for the same power than either the Scotch or locomotive type. They can be taken to pieces and shipped in comparatively small packages to a vessel in any part of the world; arrived at their destination, the old coil boilers (if the ship is so fitted) can be taken to pieces and hoisted up the fire-room hatch and the new ones lowered and connected together, all by the force on board. They can be forced with greater safety than can a shell boiler, since in a properly designed coil boiler the circulation of water will increase with the intensity of the fire, and if steam is washed off a heating surface as soon as it is formed, no overheating nor burning can occur. A serious explosion with this type of boiler is impossible.

The use of boilers of the coil type in vessels of small displacement and enormously large power, like torpedo-boats and cruisers, is already a necessity, and, in my opinion, it will not be many years before their use will be general in all steam-vessels, merchantmen as well as men-of-war. The most serious objection to them is that they require.clean fresh water for feed, but by the use of evaporators and filters this can be accomplished.

STEAM TRIALS OF NEW VESSELS.

Baltimore.—The contractors for this vessel being dissatisfied with the result of the trial made on the 14th of September, 1889, asked for and were granted permission to make another.

Before starting on the second trial the main valves of the high-pressure cylinders were altered to allow steam to follow a larger fraction of the stroke, to give it a better distribution and a freer exhaust. The pitch of the propellers was also increased from 20 feet to 21.5 feet, as the former trial had shown that the number of revolutions of the engines could not be safely increased. The air-pumps were overhauled with the result of slightly increasing the vacuum for the starboard engine.

The wisdom of these changes was fully shown on the second trial, made on the 15th of November, 1889, and which was in all respects a success, for by using the auxiliary boilers in addition to the main ones and carrying the steam at as high pressure as the safety-valves would permit, the aggregate equivalent pressure on the low-pressure pistons was increased 3.56 pounds per square inch, and the aggregate indicated horse-power of all the machinery was 10,064.42 horse-power, an increase of 1,086.54 horse-power over that of the first trial.

Full data of this second trial are given in the accompanying table.

Philadelphia.—This was the first vessel to be tried under the new conditions of premium based on speed instead of power. The contractor's trial took place on the 25th June, 1890, and passed off without mishap, though the results in both speed and power were hardly as high as expected. The engines were run at as great a number of revolutions as was deemed prudent without heating the bearings, as allowing steam to follow as great a fraction of the stroke of the high-pressure pistons as was possible would have increased the revolutions; steam was cut off at six-tenths the stroke instead of three-quarters. The boilers could have furnished ample steam for this later cut-off, and I am convinced that the proper thing to do is to increase the pitch of the propellers, as was done with the *Baltimore's*, allow the steam to follow as far as possible in the high-pressure cylinders, and work the boilers up to their full capacity. If this is done I believe the *Baltimore's* performance will be surpassed, for the hulls of the two ships are nearly identical; the *Philadelphia* has more heating surface in her boilers, and her engines are superior in many respects, notably in having piston-valves.

Full data of the trial are given in the table.

San Francisco.—The contractor's trial of this vessel, which was also for speed, was made on the 27th August, 1890, in the Santa Barbara Channel, and was in most respects a success.

All the machinery worked admirably except the eccentric straps; these had such a tendency to heat that a free use of water was necessary to keep them cool. The reason for this heating was that the straps are made of composition and the eccentric sheaves of cast-steel, a combination that has been found (since the design was made) not to work well together at high pressures and velocities. The straps have since been rebored and fitted with white metal linings, as has been found necessary in the case of other vessels, and no further trouble from heating is anticipated.

The forced draft on this vessel is by closed ash-pits, and its working was entirely satisfactory. Officers who have been on recent trials with both this system and closed fire-rooms report that the former is much less severe on the boilers, gives better results, is more easily managed, and the firemen work to better advantage. After the contract trial for speed one of the boilers was driven at full power under forced draught for eight consecutive hours to determine the coal consumption, and no better proof can be given of the good design of the boiler than that it stood this test without injury.

By oversight the water used for cooling the eccentric-straps was allowed to accumulate in the bilge till it reached such a height that it flowed into the air-ducts through a drain-valve that had been left open. From here the water was blown into some of the furnaces, nearly extinguishing the fires; and for a portion of the third hour of the trial (while the bilge was being pumped out) forced draught was shut off from six furnaces, while, from the difficulty of clearing the duct as well as the bilge, it was necessary to run two furnaces under natural draught for the last two hours of the trial. It seems quite certain, therefore, that with proper management these engines can easily be made to develop more than 10,000 horse-power.

Full data of the trial are given in the table.

Vesuvius.—This vessel was given a trial on the 10th May, 1890, to ascertain the indicated horse-power of the machinery. It was so short (only eighteen minutes) that nothing but the indicated horse-power could be obtained. The power developed during this period was somewhat in excess of the contract requirement.

Full data of the trial are given in the following table:

Full power forced draft contract trials of twin-screw steel vessels of the U. S. Navy.

1	Name of vessel	BALTIMORE		PHILADELPHIA		SAN FRANCISCO		VESUVIUS.	
2	Date of trial	Nov. 15, 1889, second trial.		June 25, 1890		August 27, 1890		May 10, 1890.	
3	Duration of trial (during which data were taken)	4 hours		4 hours, 15 minutes		4 hours, 6 minutes		18 minutes.	
4	Place of trial	At sea, off capes of Delaware Bay.		Off south side of Long Island and Block Island.		Santa Barbara Channel.		Delaware Bay.	
5	Condition of weather	Strong breeze; rough sea.		Smooth sea; light wind.		Smooth sea; - light wind.		Smooth sea; light wind.	
6	Length between perpendiculars	315′ 0″		315′ 0″		310′ 0″		246′ 3″	
7	Beam	48′ 6″		48′ 6⅝″		49′ 1⅜″		26′ 5″	
8	Mean draught on trial	19′ 10⅜′		19′ 2⅜″		18′ 9″		9′ 7″	
9	Displacement on trial, tons	4500		4325.0		4088.0		771.0	
10	Immersed midship section on trial, sq. ft	833		815.0		770.0		192.0	
11	Co-efficient of fineness, prismatic	0.5187		0.515		0.501		0.433	
12	Type of engine	Horizontal, triple expansion.		Horizontal, triple expansion.		Horizontal, triple expansion.		Vertical, triple expansion.	
13	H. P. cyl. diam. ins	42		38		42		21.5	
14	I. P. cyl. diam. ins	60		58		60		31	
15	L. P. cyl. diam. ins	94		86		94		2, each 34″	
16	Stroke of pistons, ins	42		40		36		20	
17	Number and type of boilers	4 double-end, 2 single-end.		4 double-end, 1 single-end.		4 double-end, 1 single-end.		4 low cylindrical.	
18	Length and diameter of each	D. E. 17′ 8″x14′ 8″, S.E. 6′ 2″x7′ 2″.		D. E. 20′x14′, S. E. 8′3″ x8′ 6″.		D. E. 19′ 2″x14′ 8″, S. E. 8′x8′.		19′ 8″x9′ 0″.	
19	Number and diameter of furnaces in each	D. E. 8-36″, S. E. 1-32″.		D. E. 8-36″, S. E. 2-32″.		D. E. 6-42″, S. E. 1-39″.		3-33″	
20	Total grate surface, sq. ft., used on trial	676		624 main boilers only.		567.6		195	
21	Total heating surface, sq. ft., used on trial	17174.6		20458		20133.8		8981	
22	Total condensing surface, sq. ft., used on trial	12638.7		13510		14518		4518	
23	Screw propeller, diameter	14′ 6″		14′ 6″		13′ 6″		7′ 9″	
24	Screw propeller, mean pitch on trial	21′ 6″		20′ 4.7″		18′ 9″		9′ 4½″	
25	Screw propeller, mean pitch adjustable between	18′ 6″ and 21′ 6″		18′ 6″ and 21′ 6″		17′ 9″ and 19′ 9″		Fixed.	
26	Screw propeller, developed area, sq. ft	57.17		57.17		57.59		15.9	
27	Screw propeller, number of blades	3		3		3		3	
28	Steam pressure in boilers	Gauges out of order		159.8		135.3		160	
29	Air pressure in fire-rooms or air ducts, in inches of water	2.09		1.49		2.00		2.00	
		Starboard.	Port.	Starboard.	Port.	Starboard.	Port.	Starboard.	Port.
30	Steam pressure at engines per gauge, lbs	125.1	123.4	151.2	154	126.2	128.4	154	156
31	Steam pressure, 1st receiver, absolute, lbs	62.2	59.3	57.6	56.5	56.1	58.1	72.5	73.3
32	Steam pressure, 2nd receiver, absolute, lbs	20.4	21.7	24.5	24.3	19.25	18.25	28.2	28.2
33	Vacuum in condenser in inches of mercury	24.5	24.3	24.3	24.7	25.7	26.1	24.6	24.3
34	Revolutions of main engines per minute	116.42	116.08	119.58	119.55	125.8	123.83	267.78	270.
35	H. P. cyl. Mean pressure	50.17	52.29	61.96	57.73	51.37	46.45	51.22	56.03
36	H. P. cyl. I. H. P	1682.65	1749.17	1645.1	1560.47	1590.06	1427.92	496.20	547.87
37	I. P. cyl. Mean pressure	21.87	22.49	21.8	19.91	25.84	26.8	30.61	26.2
38	I. P. cyl. I. H. P	1514.10	1555.69	1352.17	1825.24	1668.63	1700.43	620.82	535.83

39	L. P. cyl. Mean pressure	9.52	9.84	8.91	9.99	9.92	10.64	fo'd 15.46 aft 16.70	fo'd 1'.15 aft 15.94
40	L. P. cyl. I. H. P.	1626.62	1680.61	1249.73	1400.46	1594.39	1664.29	fo'd 874.01 aft 403.91	fo'd 345.63 aft 388.69
41	Aggregate equivalent mean pressure on L. P. piston	28.23	29.20	30.34	30.63	30.32	30.68	39.04	37.14
42	Collective I. H. P. each main engine	4845.59	4985.48	4247.01	4286.17	4788.08	4792.64	1894.94	1816.92
43	Collective I. H. P. both main engines	9831.07		8533.18		9580.72		3711.86	
44	I. H. P. air-pumps	Worked from main engine.		31.56	33.32	66.48	41.22	Worked from main engine.	
45	I. H. P. circulating-pumps	23.21	23.21	30.27	24.69	14.36	15.07	20.0	
46	I. H. P. feed-pumps	28.81		34.48		42.85		12.0	
47	I. H. P. blowers	110.86		87.59		110.67		50.0	
48	I. H. P. other auxiliaries	70.48		39.70		41.55		1.0	
49	Aggregate mean I. H. P. of machinery	10064.42		8814.79		9912.93		3794.86	
50	Aggregate maximum I. H. P. of machinery	10725.6		9021.47		10604.32		....	
51	Speed per hour in knots	*19.84		19.68		†19.52		‡21.42	
52	Slip of propeller, per cent	19.68	19.45	18.43	18.49	16.11	14.80	13.56	14.25
53	Indicated thrust of main engines only, per square foot of developed area of screw.	1117.6	1153.0	1005.4	1015	1163.8	1182.8	1566.5	1489.8
54	I. H. P. per square foot of grate, based on mean I. H. P.	14.89		14.13		17.46		19.46	
55	Heating surface per I. H. P., based on mean I. H. P.	1.71		2.32		2.03		2.37	
56	Condensing surface per I. H. P., based on mean I. H. P.	1.26		1.53		1.46		1.14	
57	Weight of propelling machinery, tons, including water	956.12		851.62		914.12		248.73	
58	I. H. P. per ton of machinery, mean I. H. P.	10.53		10.35		10.84		15.26	
59	I. H. P. per ton of machinery, maximum I. H. P.	10.95		10.59		11.60		....	
60	Total coal burned per hour, pounds	30353.0		25818.0		....		Not measured.	
61	Refuse from coal per hour, pounds	2124.0		1678.0		....		Not measured.	
62	Coal per hour per square feet grate surface	44.9		39.35		....		....	
63	Coal per hour per I. H. P.	3.15		2.93		....		....	

* On the basis of 19¼ per cent. slip of mean revolutions of the two screws; mean speed by patent log was 20.1 knots.

† Speed for last half hour between points on shore 20.17 knots; mean speed for trial by patent log 20.6 knots.

‡ Estimated from speed trial on basis of revolutions in the two cases.

In the *Baltimore*, *Philadelphia*, and *San Francisco* the Navy possesses three fast and useful vessels, and the Department has cause for congratulation in their excellent performances, all of which have been free from serious mishaps or failures. This is believed to be due, in great degree, to not having carried the reduction in the weight of their machinery to the extreme that has been attempted in some foreign vessels, which have given such trouble by their repeated failures, that it has been found necessary to direct that in future a reasonable weight shall be allowed (especially in the boilers) for a required power. All these failures emphasize the remarks on weight of machinery in my report for last year.

The result of the two trials of the *Baltimore* also shows conclusively the necessity of trying a ship, and especially a high-powered one, under different conditions of engines and propeller. It is by no means certain that the best results of which they are capable have yet been obtained from any of the new ships, and the value of the information to be gained by trying each of them over and over again with propellers of different pitch, diameter, area, and form, can not be overestimated. More than this, it is not just to either the ship or the designer to decide on her merits on a single trial. Had the builders of the *Baltimore* been content to let her go on her first trial she would have been pointed out as a questionable success, and it would have been loudly asserted that the American ship-builders could not even work from a design furnished them. As it is, the ship earned her builders a premium of over $100,000, and has made for them and for herself a record that will not be lost.

Another and important point to be considered in connection with speed and power trials of a ship is that from them the supposed steaming radius is determined. The coal consumed is never accurately determined on a trial made by the contractors for speed or power, for the simple reason that it takes too much time, and the scales and weighing party are in the way of the firemen, so an estimate is made of the coal burned in a given time and an elaborate set of tables and calculations made therefrom. In other words, a whole number is guessed at, and from this a result is calculated to the seventh place of decimals. No account is taken of the coal being the very best obtainable, of the ship's bottom being perfectly clean and in good condition, the tubes swept, the fires clean, and everything possible done to enable the full power to be gotton out of the boilers. Now, to determine the steaming radius correctly requires that a series of trials be made with the ship at the different speeds for which the radius is to be determined and with her coal supply at least half burned out, as there is a vast difference between the coal that runs out into the fire-room from a lately filled bunker and that which has to be swept up and carried out when the supply is half exhausted. Each of these trials (at different speeds) should be of several hours' duration, that the coal consumption may be determined with some degree of accuracy. The condition of the ship's bottom will also have much to do with her radius of action; just how much can only be determined by trial.

This question of coal endurance, or steaming radius, or radius of action, is creating great uneasiness abroad, and in some instances the maneuvers have shown that a ship rated as good for 7,000 miles at 10 knots speed can not really go 4,000 miles at eight knots; and even this may be reduced when the ship has been out of dock a short time longer.

A trial should also be made to determine the correctness of the statement sometimes made that there is not a single modern ship in any navy that can be run at full speed except with full bunkers, as when the coal supply is one-half exhausted and coal has to be transported some little distance and through numerous water-tight doors in bulkheads it cannot be got out as rapidly as the furnaces will consume it.

STEEL CASTINGS.

In my report for last year attention was called to the ill success that had attended numerous attempts to use steel for machinery castings, and the experience of the past year has been to still further emphasize all that was then said. Reports have been received of failure after failure to produce sound castings of comparatively simple form and moderate weight, and design and patterns have been altered in the hope that better results might be obtained with change of form. In many cases the changes have availed nothing, and after long delays application has been made to use forged steel or cast iron; in others, when the dimensions have been increased to nearly what would be required for the latter metal, sound castings have been obtained. The truth of the matter is that the manufacturers have not kept pace with the demands of the consumers, and unless there is a very great improvement in the making of steel castings, and in a very short time, a return to cast-iron will be inevitable, since it is evident that the only reason for using the more expensive material is that the weight of the parts may be decreased in the proportion of its greater strength.

MACHINERY UNDER CONSTRUCTION FOR NEW VESSELS.

The state of work on the machinery of the vessels reported upon in my last annual report is as follows:

Philadelphia.—Machinery completed; vessel delivered to the Government, and is now in commission.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

An auxiliary condenser, fitted with the necessary pumps, fittings, and connections, has been put in the ship in addition to the original outfit.

An additional oil-tank has been fitted.

Drain cocks on boilers have been omitted.

San Francisco.—The machinery has been finished, the ship has been tried, and has been accepted by the Government.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Single-acting bucket-plunger pumps have been substituted for the double-acting pumps, and diameter of pump barrels increased from 20 to 26 inches.

Condensers have been covered with magnesia sectional covering.

Flat grate bars, 3 inches deep, have been substituted for the square revolving ones originally specified.

Telescopic oiling gear has been substituted for the centrifugal oiling attachments originally intended.

Portable tachometers have been substituted for revolution indicators on the blower engines.

Five additional radiators have been supplied.

Additional pipes and cocks have been supplied for the indicator gear.

Two spare main eccentric straps have been supplied.

The cast-copper expansion flanges on main steam-pipes failed when tested, and have been replaced with hammered copper flanges.

One set of extra studs and nuts for propeller-blades has been supplied.

White metal linings have been fitted in main eccentric straps.

Newark.—The machinery of this vessel has been completed, with the exception of fitting lagging to the condensers and receiver pipes, and the engines have been submitted to the dock trials.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved:

An auxiliary air and circulating pump and condenser has been fitted in addition to the original outfit.

Additional oil-tanks have been supplied.

Concord.—The machinery of this vessel is completed in place, and has been tried, with the ship under way, by the contractors; a change is now being made in the brick division-walls in the combustion chambers; a feed water-heater is being fitted in the up-takes; fitting the tachometers in place and a few other minor details remain to be completed.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Diameter of steam-cylinders of air and circulating pumps increased from 12 inches to 14 inches.

Condensers lagged with non-conducting material.

Plan of dynamo piping re-arranged.

A system of signal gongs furnished for engine-room in addition to the signaling apparatus originally designed.

A hinging arrangement for folding the after fire-room ventilators has been adopted.

Bennington.—The machinery of this vessel is completed and is fitted in place on board with the exception of building brick divisions in the combustion chambers of the furnaces, this being delayed in order to get the benefit of experience to be derived from the trial of the *Concord;* a few minor connections, such as to engine-room, annunciators, and tachometers, remain to be made after the joiner work is finished.

The following changes in addition to those enumerated in my last annual report have been proposed by the contractors and approved:

Diameters of steam-cylinders of air and circulating pumps increased from 12 inches to 14 inches.

Condenser covered with non-conducting material.

Plan of pipe connections to dynamo altered.

Signal gongs provided for engine-room in addition to the outfit originally specified.

Maine.—All cylinders have been cast and bored; cylinder covers and liners, valve-chest covers, and other cylinder attachments are cast and mostly machined; eccentric straps and gibs, link-bars, and details of valve-gears well advanced; details of reversing and turning engines and other auxiliary machinery well in hand; the forward and after sections of propeller-shafts are finished; three sections of crank-shafts are machined and four other sections are ready for shipment from the makers; linings and bushings for stern-tube and bracket bearings, also the propeller-blades, caps, bosses, and bolts are nearing completion; the starboard stern tube and bracket are bored to finished size in place and the port bracket is rough-bored; most of the sea valves and connections are fitted in place on board the vessel; both condensers are well advanced towards completion; nine of the wrought-steel columns for main engines are forged; main steam stop-valves are well in hand; all flanging and planing of boiler-plates is completed and annealing of flanged plates nearly completed; all combustion chambers have been fitted to furnace flues and riveting on them begun; nearly all of the back tube-plates are riveted to furnaces; shell-plates for seven of the boilers have been rolled to form and drilled; back tube-sheets are drilled for tubes; braces are all forged and the work of forging fittings for man and hand hole plates and furnace fronts is well advanced.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved:

Connecting rods and eccentric rods lengthened three-fourths of an inch.

Nickel composition substituted for cylinder relief valve-seats.

Steering engine modified to suit the space provided for it.

Forged steel substituted for cast-steel as material for rock-shaft arms.

Sturtevant blowing-engines substituted for the three-cylinder engines originally intended.

Stern tubes and brackets and fittings of same slightly modified to conform to plans of Bureau of Construction and Repair, Form of engine foundations slightly changed to give additional strength.

Forged-steel engine columns have been adopted on account of the difficulty experienced in getting cast-steel ones made.

Cast-iron substituted for cast-steel as material for steam-chest covers.

Forward coupling-sleeve made of forged steel instead of cast-steel.

Texas.—The machinery for this vessel is being built by the Richmond Locomotive and Machine Works, of Richmond, Va., from designs furnished by the Naval Construction and Armament Company, Barrow-in-Furness, England.

H. P. cylinders are cast and bored; piston-valves, valve-liners, cylinder and valve chest covers, piston-rods, valve-stems, and other parts belonging to these cylinders are nearly completed; I. P. cylinders are both cast and bored; cylinder-liners, piston-rods and other details are well advanced; L. P cylinders are not yet cast, but many of the attachments for these cylinders are finished or well in hand; one engine column has been received and planed; castings for cross-heads all received and partly machined; eleven castings for bed-plates have been received and nine of them are nearly machined; line-shaft bearing blocks are finished and thrust-blocks far advanced; three connecting-rod forgings have been received and are being machined; condensers are about four-tenths finished; six crank-shaft brasses are fitted in place; reversing engines, turning engine, valve gear, eccentrics and straps, sea-valves, stop-valves, and other details are well advanced; all patterns for main engines, circulating pumps, and blower engines are finished; patterns for other auxiliary machinery have been made; the boiler-work has been delayed on account of the difficulty experienced in getting satisfactory plates for the boiler-shells; twenty-four corrugated furnaces have been received, flanged, and drilled; twenty-nine tube-sheets have been drilled; one back connection has been riveted up, and two tube-sheets riveted to furnaces. In general, the machinery of this ship is about four-tenths finished.

Monterey.—The machinery was described in my last annual report under head of armored coast-defense vessel

The contract for hull and machinery on Department plans throughout was awarded to the Union Iron Works, San Francisco, for $1,628,950.

Contracts for all material have been let and much of it has been received.

The H. P. cylinders are cast and machined; liners finished and fitted in place; valve-chest liners finished and fitted in place; cylinder covers, valve-chest covers, and man-hole covers are finished and fitted in place. Patterns for I. P. cylinders are made; cylinder and valve-chest covers are finished; valve-chest liners are cast and nearly finished.

Foundations are laid for erecting the engines; five sections of bed-plates have been received and are being machined; all bolts for bed-plates are made; fourteen Y-frames have been cast, of which only six have been accepted, and are being machined.

Two propeller-shafts and all their details have been received; casings, propeller-hubs, and all other details have been finished and fitted to shafts; propeller-hubs, studs, nuts, and guards are finished and fitted. All linings for stern tubes, bushings, and liners are finished and fitted together. Stern-tube stuffing-boxes and liners are finished and fitted to forward section of bushing.

Both thrust bearings are finished and fitted, except lining with white metal. All crank-shaft pillow-blocks are finished except fitting to shafts. Patterns for line-shaft pillow-blocks are made.

All pistons have been cast and the work of machining and fitting them nearly finished; all piston-rods are finished and fitted; all cross-heads have been finished, and the cross-head guides are nearly finished; the H. P. and I. P. connecting-rods are finished and fitted together, and the L. P. rods are nearly finished.

Work on main piston-valves, valve-gear, eccentrics, eccentric rods, and reversing gear is well along and progressing satisfactorily. The fire and bilge pumps and ash-hoisting engines are finished; turning engines and circulating engines and pumps are well under way; condenser-tubes have been received.

All shell-plates and back head-plates of the two cylindrical boilers for this vessel have been riveted together; head-plates for one boiler have been riveted together; stiffening angle-irons for boiler heads are fitted to place; combustion chambers are finished; furnaces are nearly finished; all man-hole plates are finished; boiler-tubes have been received.

As stated in my last annual report, the Bureau had decided, for the purpose of diminishing the machinery weights, to use tubulous boilers for about three-fourths of the boiler-power of this vessel. Of the boilers offered for tests in pursuance of the Department's advertisement and circular dated August 2, 1888, relative to coil, tubulous, or sectional boilers, only two were finally submitted for the prescribed trials, these being offered by William Cowles, of New York, and Charles Ward, of Charleston, W. Va. The results of the test were in favor of the boiler submitted by the latter, and in consequence a contract was entered into with Mr. Ward, July 15, 1890, for four of these boilers of a collective horse-power of 4,500 for the consideration of $90,000. By the terms of this contract the boilers are to be erected and fitted on board the *Monterey* within ten months from the date of contract.

The following enumerated changes in the machinery have been proposed by the contractors and approved:

Piston-valve packing rings to be made of tool-steel instead of cast-iron.

Phosphor bronze substituted for cast-steel for reversing-shaft bearings.

Eccentrics to be made of forged-steel instead of cast-steel.

Eccentric-straps, eccentric-rods, reversing-links, and link-blocks slightly modified as to dimensions and location, incidental to the change mentioned above.

Main condenser increased in diameter to allow of more room in spacing the tubes.

Slight modifications in details of reversing gear.

Fire-room ventilating fans changed in location.

The original design of air-pump has been abandoned and Dow's air-pump substituted instead.

A number of small changes, such as position of main-valve chests, conformation of bed-plates, etc., have been authorized, to harmonize the plans of machinery.

The condition of work on machinery being built at navy-yards for new vessels is as follows:

Monadnock.—The machinery building at the navy-yard, Mare Island Cal., for this vessel consists of twin-screw, triple-expansion, horizontal, direct-acting engines, designed to develop with the auxiliary machinery about 3,000 I. H. P., when making 150 revolutions per minute with steam of 160 pounds pressure.

The work of building this machinery is progressing satisfactorily; all main cylinders are cast, bored, and planed; cylinder and valve chest liners are bored and fitted to place; main pistons and piston-valves are nearly finished; piston-rods are finished except in length; cross-heads and connecting rods are finished; engine-frame tie-rods are finished except in length; seven valve-stems are finished and the others are well along; valve rock-shafts, reversing shafts and arms are well in hand; eccentric-rods are finished and valve gear partly finished; two engine-frame pillow-blocks are planed, bored, and machined for holding down bolts; crank-shaft brasses are cast and partly fitted; shells of both condensers are ready for water test, and most of the details of condensers are completed; the reversing engines are well advanced; the riveting of one boiler is completed and the other three are riveted except securing furnace ends to front heads; all combustion chambers are fitted in place; all but twelve of the through braces are finished; the boiler-tubes have all been received and are ready to go in place.

Cruisers Nos. 7 and 8.—The machinery of these two vessels was described in my last annual report, and is being built at the navy-yard, New York, where excellent progress is being made. The H. P. and I. P. cylinders are finished except fitting studs and stuffing-boxes; the L. P. cylinders are cast and partly machined; all cylinder-heads are finished; five pistons are partly machined; all piston-rods, tie-rods, and connecting-rods are well advanced; L. P. cylinder columns are planed and partly drilled; brasses for crank-shafts, crank-pins, cross-head and eccentric rods are cast and partly machined; eccentric-straps and rods, link-blocks, suspension-rods, valve-stems, and other details of valve motions are nearing completion; details of reversing gear and turning engines are well in hand; twelve boiler stop-valves and twenty-four feed check-valves are finished, and much work has been done on injection and blow valves; braces and stay-bolts for boilers are being turned; no work has yet been done on the shells of the boilers on account of the delay that has occurred in regard to the delivery of steel plates from the manufacturers.

The changes here enumerated have been found desirable and have been made.

Form of stern tube modified to give additional strength.

All steam-chest linings have been made alike, so as to make them interchangeable.

The contractors for steel castings for engine-columns, after repeated unsuccessful attempts to secure serviceable castings, informed the Bureau of their inability to make the columns. Steps have been taken to have the columns made of cast-iron.

The state of work done up to October 1 on the machinery of vessels contracted for during the past year is as follows:

Gun-boat No. 5.—The contract for this vessel, hull and machinery complete, according to the Department's plans and specifications, was awarded April 12 to the Bath Iron Works, of Bath, Me., to be completed April 12, 1892, for the sum of $318,500.

Work on drawings for the machinery of this vessel is in progress; patterns for bed-plates, cross-heads, and some smaller parts are finished, and pattern for I. P. cylinder is well under way; contracts for crank and line shafting have been let.

The following changes have been proposed by the contractors and approved by the Bureau:

Length of boilers slightly increased and minor details modified.

Form of cylinder bottoms modified.

Form of top of condenser changed.

Crank-pin end of connecting-rod changed in form.

Cylinder-heads to be made of cast-iron instead of cast-steel.

Slight change in shape of top of bed-plate.

Fire-room blowers to be set at right angles to the arrangement originally designed.

Gun-boat No. 6.—The contract for this vessel was awarded to the Bath Iron Works the same date and under the same conditions as described above for gun-boat No. 5. The same amount of work has been done on the machinery and the same changes have been proposed and approved as for gun-boat No. 5.

Cruiser No. 9.—The contract for this vessel, hull and machinery complete, according to plans and specifications furnished by the Navy Department, was awarded November 2, 1889, to the Columbian Iron Works and Dry Dock Company, of Baltimore, Md., to be completed two years and six months from date of contract, for the sum of $612,500.

Contracts for material have been let and considerable material has been received; H. P. cylinders have been finished with the exception of a few minor parts; L. P. cylinders are being machined; one I. P. cylinder is cast; all cylinder covers are cast and some of them are machined; one H. P. piston is turned and fitted; all piston-valves are cast, and I. P. and L. P. valves and followers have been turned; the H. P. and I. P. valve-chest liners are finished; all main bearing brasses have been lined and bored; connecting-rod brasses have been cast; one section of bed-plate is machined; four sections of crank-shafts are being turned and bored; two thrust-shafts, one section of line-shaft, and two propeller-shafts have been forged; the reversing shafts have been turned, and many of the small parts of the reversing and valve gears are wholly or partly finished; all the principal patterns for main engines are finished. Four shell-sheets of main boilers have been planed, bent, and drilled; four lower sections of front heads are flanged; four upper sections of front heads have been shaped and bent; eight back-tube sheets have been flanged and six of them are drilled for tubes; four front-tube sheets are being drilled for tubes; all butt straps are bent and planed; man-hole rings, T-bars, man-hole plate-handles, and other minor details are well in hand; all straight lengths of dry-pipes are made and tinned; auxiliary steam and exhaust pipes are well advanced; 16 feet of main steam-pipe is made.

The following enumerated changes have been proposed by the contractors and approved by the Bureau:

Main bed plates and feet of "Y" frames slightly modified in form to give additional stiffness.

Main boilers to be made of four rings instead of three, and auxiliary boilers of two rings instead of one, to allow use of power rivetter.

Modification of propeller shaft and stern bearings.

Change in method of coupling line shaft.

Stuffing box to inclose the shaft coupling outside the stern-tube modified in form.

After water-head of condenser changed slightly in form to facilitate the work of molding it.

Cruiser No. 10.—The contract for this vessel was awarded to the Columbian Iron Works the same date and under the same conditions throughout as stated above for cruiser No. 9.

Contracts for material have been let and considerable material has been received; H. P. cylinders are nearly finished; one I. P. cylinder has been cast; L. P. cylinders have been bored; two H. P. pistons and one I. P. piston have been turned and followers fitted; one I. P. piston follower is turned; I. P. and L. P. valve-chest liners have been bored; main bearing brasses have been planed, lined, and bored; all crank-pin brasses have been planed and bored; piston-rod and valve-stem stuffing-boxes are finished; all packing-rings have been cast; all piston-valves have been cast; I. P. and L. P. piston-valves and followers have been turned and drilled; all connecting-rod brasses, cross-head end, have been cast and are being finished; forgings and castings for details of valve gear and reversing gear are well in hand; four sections of crank-shafts have been received and are being machined; two forward sections of line-shaft have been received, and the 5-inch axial-hole has been bored through each; one thrust-shaft, one section of after line-shaft, and one propeller-shaft have been received; bolts for couplings, cylinder-covers, valve-chest covers, connecting-rods, etc., have been forged and are mostly finished; six main bearing-caps have been planed; four back-tube sheets for main boilers have been flanged and drilled for tubes; one lower sheet of boiler-head has been flanged for furnaces and shells; four front-tube sheets have been punched for drilling; all butt-straps have been planed and bent; one sheet for auxiliary boiler has been drilled and flanged; boiler-braces, man-hole rings, dogs and handles, angle-bars, T-bars, and other minor details are well advanced; dry-pipes and auxiliary steam and exhaust pipes have been made; 16 feet of main steam-pipe is finished; all principal patterns for main engines have been finished; patterns for air-pumps and condensers are finished.

The same changes have been proposed by the contractors and approved by the Bureau as are enumerated above under cruiser No. 9.

Cruiser No. 11.—The contract for the construction of this vessel, hull and machinery complete, to be finished two years and six months from date of contract, was awarded November 11, 1889, to Mr. Harrison Loring, of Boston, Mass., for $674,000. The machinery is being built at the works of N. F. Palmer & Co., New York. The cylinders are cast and bored and most of their fittings are well in hand; piston-valves, valve-chest covers, crank-shaft bearing-caps, one L. P. and two I. P. pistons are in process of machining; eccentric rods and straps, eccentrics, link-blocks, suspension-links, and other details of valve motions are well in hand; patterns for turning and reversing engines completed; boiler work has been laid out and some work has been done on front-heads and back-tube sheets; 1,421 boiler-tubes are finished.

The following enumerated changes have been proposed by the contractors and approved by the Bureau:

Fronts of boilers to be made in two instead of three sheets.
Cross-heads to be made of wrought-steel instead of cast-steel.
Size and location of man-hole plates altered.

The contractors have been given permission to submit a built-up, wrought-steel engine-column in place of the cast-steel ones designed, they having reported their inability to obtain the castings.

Cruiser No. 6.—The contract for the construction of this vessel, hull and machinery complete, according to plans and specifications furnished by the Navy Department, was made with the Union Iron Works, of San Francisco, Cal., July 10, 1890, for the sum of $1,796,000; the vessel is to be complete and ready to deliver to the Government on or before the 1st of April, 1893.

Work is now in progress on drawings and patterns, and preparations are being made to begin active work on the machinery.

The following changes have been proposed by the contractors and approved:

Bed-plates stiffened under engines.
Modification of water circulation in lower shaft-bearing brasses.
Stern-shafts and stern-bearings changed slightly.
Modification of strengthening webs in cast-steel "Y" frames.
H. P. cylinders to take steam from inside instead of outside of piston-valves.
Method of tying cylinders together modified.

Armored cruiser No. 2.—The contract for the construction of this vessel, hull and machinery complete, on plans furnished by the Navy Department throughout, was awarded August 28, 1890, to William Cramp & Sons, of Philadelphia, Pa., for $2,985,000, to be completed in all respects on or before January 1, 1893.

The contractors are now engaged on the drawings of machinery and are making preparations to begin active work on the vessel as soon as the *Newark* is off their hands.

The following enumerated changes in machinery have been proposed by the contractors and approved:

Piston-followers to be secured with tap-bolts instead of studs.
Forged-steel to be used instead of cast-steel for cross-heads.
Main boilers to be made 15 feet 9 inches diameter and 18 feet long instead of the dimensions specified.
Slight alterations made in connecting-rod and reversing-shaft.
Piston-valves to be made of cast-iron instead of composition.
Diameter of L. P. cylinder increased from 70 to 72 inches.
Length of crank-shafts slightly altered to suit the change in the diameter of L. P. cylinder.

Naval Academy practice vessel.—The contract for this vessel, hull and machinery complete, according to plans furnished by the Navy Department, was awarded July 18, 1890, to The Samuel L. Moore & Sons Co., of Elizabethport, N. J., to be completed 2 years from date of contract for $250,000.

The contractors are now engaged on the drawings and are making preparations to begin active work on the vessel.

BATTLE-SHIPS.

These ships are designed for a cruising speed of 15 knots and are to be propelled by machinery capable of developing, when forced, 9,000 I. H. P. and under ordinary conditions 8,000, driving twin screws.

The main engines are inverted, vertical, direct acting, triple expansion, with cylinders of 34½, 48, 75 inches in diameter and 42 inches stroke, and it is estimated that at a piston speed of 900 feet per minute, or 129 revolutions, the I. H. P. will be 9,000.

Each engine and its auxiliaries will be separated from the other by a fore and aft water-tight bulkhead, so that in case of accident to one engine the other would not be affected.

The main valves will be of the piston type, worked by Stephenson, double bar, links; one valve for each high-pressure cylinder, two for each intermediate, and four for each low-pressure cylinder, the diameter of all the valves being 17 inches.

The intermediate and low-pressure cylinders are steam-jacketed at sides and bottom, the high-pressure ones have linings, but are not jacketed. The framing consists of an inverted Y-column at the back of each cylinder and two forged steel cylindrical columns at the front, similar to that for No. 6. The engine bed plates will be of cast steel supported on wrought-steel keelson plates which are built in the ship.

The piston-rods, valve-stems, and all working rods are to be of mild forged steel; the pistons will be of cast steel.

The crank-shafts will be of mild forged steel; they will be made in three sections which will be reversible and interchangeable with each other and with those of the other engine. They will be 14 inches in diameter in the journals and 15 inches in the pins, and have axial holes of 6 inches in diameter through the former and of 6¼ inches through the latter.

There will be a separate condenser for each engine, made with cast-brass heads and rolled-brass shell, bolted and riveted together. The castings will be seven-sixteenths inch in thickness and will contain all the nozzles for steam and water openings. The shell will be one-fourth inch thick, butted, strapped, riveted, and soldered together. The diameter will be 5 feet 9 inches, and length between tube sheets 10 feet 3 inches. Each condenser will contain 3,788 seamless drawn-brass tubes, five-eighths inch outside diameter, giving 6,353 square feet of cooling surface of the outside.

Condensing water will be supplied each condenser by a centrifugal circulating pump capable of discharging 9,000 gallons of water per minute from sea or bilge.

The air-pumps for each engine will be two vertical, single-acting, lifting pumps of 20 inches diameter and 18 inches stroke. Owing to the difficulty which has been experienced in running the air-pumps at low speed when the rods are directly attached to the engine driving them, the bureau has designed this pump to be driven by an engine to be connected with it by spur gearing and making 2½ revolutions for each double stroke of the pump. The small spur wheel is to be made of rawhide to lessen the noise when working. The cylinders of the air-pump engine are 6 inches diameter and 12 inches stroke, and exhaust into either receiver or into the condenser at will. The pumps are entirely of composition.

There will be four main and two auxiliary boilers, made of mild steel of the horizontal, return, fire-tube type, and intended for a working pressure of 160 pounds.

The main boilers will be 15 feet outside diameter and 18 feet long, double ended and with shells $1\frac{1}{16}$ inches in thickness. Each boiler will contain eight corrugated steel furnaces 3 feet internal diameter. The tubes will be lap welded or seamless drawn steel, 2½ inches outside diameter, and the ordinary ones No. 12 B. W. G. and the stay tubes No. 6 B. W. G. in thickness. The main boilers will have about 17,460 square feet of heating surface and about 552 square feet of grate; the auxiliary boilers are the same as those designed for armored cruiser No. 2, and contain 1,937 square feet of heating surface and 64 square feet of grate. The main boilers will be arranged in groups of two with two smoke-pipes. The auxiliary boilers will be above the protective deck.

The ship is intended to cruise under very light forced or natural draft and has been given large heating surface for this reason.

There will be a main and auxiliary feed-pump in each fire-room, with an additional auxiliary feed-pump in each engine-room, the whole capable of supplying many times the quantity of water needed at full power.

There will be evaporators, distillers, auxiliary pumps, blowers for draft and ventilation, and the other auxiliaries now furnished ships of this class, together with the necessary hydraulic plant for loading and handling the battery.

The propellers will be manganese bronze, or approved equivalent metal, with adjustable blades.

This machinery is shown in plates 13, 14, 15, 16, 17, 18, 19.

ARMORED CRUISER NO. 2 OF 8,100 TONS.

Keeping in view the great power necessary to drive a vessel of this size at the high speed of 20 knots, the Bureau, in designing the propelling machinery, thought it advisable to divide up this power in four parts; for this reason it has placed two engines of about 4,000 I. H. P. each, on each twin-screw shaft. These engines may, by means of an easily worked coupling, be readily disconnected from each other, which enables the ship when cruising at low speeds to be driven by the after-set of engines only; and as these may then be worked at nearly the power for which designed, and with full boiler pressure, the economy will not be reduced (or, rather, lost altogether) as is the case when a triple-expansion engine is worked at a low power and with reduced pressure.

The disadvantages of this design are increase in weight and space occupied by the machinery and greater number of parts, but it is considered that these are outweighed by the advantages above mentioned.

The propelling machinery consists of four vertical, inverted, direct-acting, triple-expansion engines, each having cylinders of 32, 46, 70 inches in diameter with a common stroke of 42 inches, driving twin screws. The collective I. H. P. (including auxiliaries) is estimated at about 16,000 when the main engines are making 129 revolutions per minute, a piston speed of about 903 feet.

Piston-valves are used exclusively, one for the high, two for the intermediate and low-pressure cylinders; for the two former their diameter is 16 inches; while, for balancing purposes, the low-pressure valves are made of different areas, the mean diameter being 29½ inches. The valves are driven by double-bar Stevenson links.

The I. P. and L. P. cylinders are jacketed on the sides and bottoms; the H. P. cylinder is fitted with a lining, or wearing cylinder, of hard cast-iron. All of the pistons are of cast-steel.

The cylinders will be supported on inverted Y-frames of cast-steel; the cross-heads will run on cast-iron guides bolted to the frames. The bed-plates will be of cast-steel, I-section, securely bolted to the engine keelsons which are built in the ship.

The piston, connecting, and other working rods are of mild forged steel. The crank-shafts are also of mild forged steel and in three sections for each engine. The forward shafts are 13½ inches in diameter with 6-inch axial holes; the after-shafts are 17 inches in diameter, with axial holes of 7½ inches. The shafts are not interchangeable.

There will be a cast-steel coupling between each forward and after engine crank-shaft; it will occupy but little room, and by it the engines may quickly be coupled or uncoupled. It is the intention to use the after-engine alone for moderate steaming. Each engine, with its auxiliaries, will be located in a separate water-tight compartment and be entirely independent of the others.

The main condensers will be made of cast composition and rolled brass, bolted and riveted together; they will be in three sections, 5 feet 9 inches in diameter and with a total length of 9 feet inside the tube sheets. Each condenser will contain 3,775 seamless drawn brass tubes, No. 20 B. W. G. thick, tinned on both sides, giving 5,559 square feet of cooling surface. Each tube is separately packed ,at each end and is free to expand independently of the others.

Condensing water is supplied by a separate centrifugal circulating pump for each engine, of a capacity of 8,000 gallons per minute; which may be discharged through the condenser or directly overboard through the outboard delivery and taken from the sea or bilge at will. The pumps will be driven by engines attached directly to the main shafts.

The air-pumps are vertical, single-acting, lifting pumps, each with two pistons of 19 inches in diameter and 18 inches stroke. They are driven by vertical engines, with cylinders of 7¼ inches in diameter, and of same stroke as the pumps, placed directly over them. The air-pump engines are simple, but the steam from them may be exhausted into either the intermediate or low pressure receiver, as well as into the condenser, and so be worked with the full measure of economy.

Steam will be supplied by six double-ended steel boilers, placed below the protective deck and two auxiliary boilers placed above it. As designed the main boilers were 15 feet 3 inches in outside diameter and 21 feet 3 inches long, and the auxiliary boilers 10 feet in mean diameter and 8 feet 6 inches long.

The main boilers were to have had four corrugated steel furnaces in each end with an inside diameter of 3 feet 3 inches. The heating surface in the main boilers was to have been 31,190 square feet and the grate surface 988 square feet.

Each auxiliary boiler will have two corrugated steel furnaces of 2 feet 9 inches internal diameter. Their total heating surface will be 1,937 square feet and grate surface 64 square feet.

The tubes for the main boilers will be of steel, 2¼ inches outside diameter; for the auxiliary boilers they will be 2½ inches in diameter.

The main boiler shells were to have been butted with inside and outside straps, triple riveted. The thickness of the shell was to have been 1$\frac{13}{64}$ inches for working a pressure of 160 pounds per square inch.

These boilers were to have been arranged in two groups of three abreast, with two smoke-pipes, but the contractor, with a view to rearrangement, requested permission to alter the dimensions of the main boilers, which was allowed by the Bureau. They are now to be made about 15 feet 9 inches in diameter and 18 feet long, with same heating and grate surface, and to carry same working pressure of 160 pounds per square inch. They will also be arranged in groups of two abreast with three smoke-pipes.

Mild forced draft will be used on the closed fire-room system.

The feed system will be the same as in cruiser No. 6, as will also the other auxiliaries, including two auxiliary condensers to condense the steam from the dynamo, ventilating, steering engines, etc.

The propeller will be of manganese, or similar bronze, with adjustable blades

There will also be a hydraulic plant for supplying and working the battery.

The contract for this vessel complete was awarded to the Wm. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa. The machinery is shown in plates 20, 21, 22, 23, 24, 25, 26.

7,350-TON PROTECTED CRUISER.

This ship is intended to maintain a sea speed of 21 knots, and to attain this it has been found necessary to provide her with motive machinery capable of developing from 20,000 to 21,000 I. H. P.

Knowing that it was extremely improbable that shafting of the great size necessary to transmit this enormous power to twin-screws could be obtained in this country, either in reasonable time or with any guaranty as to its strength, the Bureau decided to depart from the usual practice and to divide the power into three parts instead of two, each being developed by a separate engine driving its own screw. It was still further influenced to do this by the knowledge that even in case of the recurrence of so remarkable an accident as that which lately happened to the *City of Paris*, this cruiser would still have a reserve of power sufficient to drive her at a good rate of speed. Indeed it is almost impossible to conceive a combination of circumstances or accidents that would render her entirely helpless.

A feature of the design that carries a strong argument in its favor is that by means of clutch-couplings either propeller can be disconnected from its engine and left free to revolve, thus retarding the way of the ship but very slightly when she is being propelled by one or two engines. A still further advantage is that in moderate cruising, say with one-third power, a few boilers can be used with the high steam pressure for which they are intended and one engine driven at the full power for which designed; by this means the power will be obtained economically instead of wastefully as is the case when a large engine is run at a low power. It is estimated that with one-third power and one screw the ship can be driven about 15 knots; with two screws and two-thirds power, from 18 to 19, the screws not in use being allowed to revolve freely in either case.

There is but little information at hand in regard to propulsion by three screws. A number of torpedo cruisers having them are built or building for the Italian navy and a cruiser of 6,000 tons so fitted is now being built in France. A number of experiments were also made with them in the latter country on the launch *Carpe*. It is not supposed by the Bureau that three screws will prove a more efficient mode of propulsion than two; on the contrary, it believes that except for the highest power they will prove slightly less efficient, but its reasons for adopting them have already been given.

The engines are to have cylinders of 42, 59, 92 inches diameter, with a common stroke of 42 inches, and are precisely like those designed for cruiser No. 6, except the air pumps, as described before, three engines being employed instead of two. They are arranged in three separate water-tight compartments, each being complete in itself, with all its auxiliaries, and entirely independent of the others, so that one or two might be completely disabled without in the least interfering with the working of the other.

The air pumps are two vertical, single-acting, lifting pumps for each engine, the pumps being 22 inches in diameter by 20 inches stroke. They are driven by two simple engines with cylinders 7 inches in diameter and 12 inches stroke, arranged to exhaust into the condenser or into either receiver. The engines are geared to make two and one-half complete revolutions for each double stroke of the pump to which it is attached.

In the experiments with the *Carpe*, referred to, it was found that when the three propellers were placed abreast of each other the efficiency of the center one was greatly impaired by the interference of the side ones with the water flowing to it. For this reason the side propellers have been placed in this cruiser about 15 feet forward of the center one, thus avoiding as much as possible working the latter in the race of the former. It will also be noticed that, looking at the ship from aft, the propellers are not in the same horizontal line, but that the side ones are placed as high as their diameters will permit; also that to bring these propellers clear of the ship's sides the side shafts incline outwards from the center line of the ship 4 degrees and also slightly upwards. The shaft of the center propeller is in the central longitudinal plane of the ship and inclined slightly downwards.

The central screw will have four blades and about 10 per cent. more pitch than the side ones, as it will work in more or less disturbed water. The side screws will be three-bladed, and the blades of all the propellers will be adjustable and will be set to the pitch on trial found to be most efficient.

Steam will be supplied by eight main and two auxiliary boilers, all built of mild steel. Six of the main boilers are 15 feet 6 inches in diameter outside and 21 feet 3 inches long, and two are 11 feet 8 inches in diameter and 18 feet 8½ inches long. The shells of the large boilers are 1$\frac{3}{64}$ inches thick; those of the small ones 1$\frac{1}{64}$ inches. The auxiliary boilers are the same as those for the armored cruiser No. 2, and all the boilers are intended for a working pressure of 160 pounds to the square inch. All the main boilers are of the Scotch type, double-ended, and with 2¼-inch steel tubes. Each large boiler has eight corrugated steel furnaces of 3 feet 3 inches inside diameter, and each small one four, with an internal diameter of 3 feet 6 inches. The heating surface of each large boiler is 5,932 square feet, of each small one 2,870 square feet, and of each auxiliary 968¼ square feet, making a total of 43,269 square feet. The total grate surface is 1,285 square feet, each large boiler having 175.5 square feet, each small one 84 square feet, and each auxiliary 32 square feet. The auxiliary boilers are placed above the protective deck.

The main boilers are arranged in groups of two, in four separate water-tight compartments, with five athwart-ship fire-rooms and three smoke-pipes.

Forced draft will be on the closed fire-room system, each fire-room being supplied with centrifugal fan blowers.

Feed-water will be supplied by a main and auxiliary feed pump in each working fire-room and an auxiliary feed pump in each engine-room.

There will be evaporators to make up the loss of fresh-water to the boilers and to supply the distillers, reversing and turning engines, fire and bilge pumps, ice machine, steam ash hoists, capstan engine, and all the other auxiliaries now fitted in the most modern ships.

Plates 27, 28, 29, 30, 31, 32, 33, 34, 35 show the machinery.

5,500-TON PROTECTED CRUISER NO. 6.

The propelling machinery of this vessel consists of two vertical, inverted, direct-acting, triple-expansion engines driving twin-screws.

The cylinders are 42, 59, 92 inches in diameter and 42 inches stroke, and it is estimated that when making 129 revolutions per minute the I. H. P. (with auxiliaries) will be 13,500.

In placing the engines in the ship the high-pressure cylinders will be forward.

The main valves are of the piston type, there being one double-ported for each high-pressure cylinder, two single-ported ones for each intermediate and four single-ported ones for each low-pressure cylinder. The valves for the high-pressure cylinders are not packed, while those for the intermediate and low-pressure cylinders are packed in the usual manner with rings. The diameters of the valves are high pressure, 18 inches; intermediate pressure, 23 inches; low pressure, 21 inches. They are driven by Stephenson double-bar links, fitted with steam reversing-gear and hydraulic controlling cylinders.

The intermediate and low-pressure cylinders are steam jacketed and the high-pressure ones provided with a lining, all the wearing cylinders being made of cast-iron as hard as tools can work it. The cylinders are supported at the back by inverted Y-frames to which the slides are attached; they are supported on the front and sides by two cast-steel cylindrical columns. The bed-plates are of cast-steel of I-section, well ribbed.

The piston, connecting and all working rods are of forged steel.

The crank shafts are of mild forged steel, 16 inches in diameter, with an axial hole of 7½ inches; the crank pins are 17 inches in diameter with 8½-inch holes axially. The crank shafts are in three sections which are interchangeable and reversible.

The condenser shells are rolled brass one-quarter inch in thickness with cast brass heads, containing the various nozzles and openings. The sheets are riveted together and to the heads and the joints then soldered. They are also fitted with man-holes and plates, and facilities for boiling out and cleaning. Each condenser contains 4,904 seamless drawn brass tubes, tinned on both sides, 11 feet 10 inches long, No. 20 B. W. G., thick, five-eighths inch outside diameter. The tubes are so packed that each may expand freely, but are prevented from crawling. Each condenser has 9,495 square feet of cooling surface and the interior is so divided by diaphragm plates that the steam will be brought into contact with all parts of it, thus rendering the whole of it efficient.

Condensing water is supplied to each condenser by two circulating pumps, each capable of discharging 6,750 gallons per minute. These pumps are to be made of composition with phosphor-bronze runner shafts running on lignum-vitæ bearings in the water space. They can also be used as bilge pumps in case of a leak, and are so fitted with valves that communication with the sea and with the bilge can not be open at the same time, thus preventing flooding the ship by accident.

The air pumps for each engine are two vertical single-acting lifting pumps, of 22 inches diameter by 20 inches stroke, driven by two simple engines with 8-inch steam cylinders attached directly to the pump rods. The exhaust from these engines can be led into the intermediate or low-pressure receiver or directly into the condenser, making them simple, compound, or triple expansion at will.

There will be six steel boilers, each 15 feet 3 inches outside diameter, and with shells 1 13/64 inches in thickness. Four of these are double-ended, 21 feet 3 inches long, and two single-ended, 10 feet 11¼ inches in length. Each double-ended boiler has eight corrugated steel furnaces and each single ended one four, all 3 feet 3 inches inside diameter. The total heating surface is 28,298 square feet and grate surface 824 square feet, amply sufficient to supply steam for the engines without unduly forcing the boilers.

It will be noticed that the water spaces in these boilers are large and that special care has been taken to avoid crowding large heating surfaces into contracted spaces, which appears to have been the principal cause of the numerous disasters to the boilers of foreign high-speed vessels. The single-ended boilers are intended to be used as auxiliaries.

Forced draft will be by closed fire-room, and air for it supplied by four blowers.

There will be two smoke-pipes.

In each working fire-room will be a main and auxiliary feed pump, each capable of supplying twice the water required when the engines are running at maximum power.

The propellers will be four-bladed, of manganese bronze, or other approved metal, the blades bolted to the hub and provision made for altering the pitch.

The ship will be fitted with evaporators, distillers, ice machine, workshop machinery, reversing and turning engines, ash hoists, pumps for all purposes, etc.

The contract for this vessel has been awarded to the Union Iron Works of San Francisco, Cal.

The machinery is shown in plates 36, 37, 38, 39, 40, 41.

HARBOR DEFENSE RAM.

The motive machinery for this vessel has been designed to give her a speed of 18 knots on a displacement of 2,050 tons.

The engines are two in number, horizontal, direct-acting, triple-expansion, and drive twin-screws. Their cylinders are 25, 36, 56 inches in diameter, with a common stroke of 36 inches; the I. H. P. is estimated at 4,800 (with auxiliaries) when making 150 revolutions per minute.

Each engine with its auxiliaries is entirely independent of the other, and is in a separate water-tight compartment.

The main steam-valves will be of the piston type and there will be one for each high and intermediate pressure, and two for each low-pressure cylinder, having diameters of 12, 21½, and 21¼ inches, respectively. They will be driven by the Marshall radial gear with compensating rock shafts. All this valve gear, except the rock shafts, will be interchangeable.

The engine keelsons will be built in the ship and the cylinders will be cast with brackets attached, by which they may be bolted to them; to the engine frames and bed-plates, the cylinders will be attached by forged steel tie-rods.

There will be one forged steel piston-rod for each engine with a cross-head working on a cast-iron bar guide; the valve rods will be of forged steel; the pistons will be of cast-steel, fitted with a wide cast-iron shoe in the high-pressure cylinder, and with a similar shoe lined with white metal in the intermediate and low-pressure cylinders.

The crank-shafts will be in two sections for each engine; they will be made of mild forged steel, 10⅞ inches in diameter in the journals and 11 inches in the crank-pins; there will be an axial hole 5 inches in diameter through shafts and pins.

The condensers will be of the usual type designed by the Bureau, and made of cast composition and rolled sheet-brass, the composition parts containing the nozzles for the exhaust, bleeder, air and circulating pumps, etc. The condensers will be 4 feet 11 inches diameter inside and 7 feet in length between tube-sheets. The circulating water passes through one-half the tubes and returns through the other half. The tubes are five-eighths inch outside diameter, No. 20 B. W. G. thick, and each condenser contains 2,035, giving about 3,361 square feet of cooling surface. The shells will be made by riveting the sheets together and then soldering the joints. There will be deflecting plates in the steam space to distribute the steam over the cooling surface. Each tube will be packed at each end and left free to expand, but prevented from crawling.

The air and circulating pumps will be selected from designs submitted by manufacturers making a specialty of such work; they will consist of two vertical, single-acting, lifting air-pumps, and a single horizontal, double-acting circulating-pump, all driven by a single direct-acting steam-cylinder, with approved valve-gear.

The boilers are intended for a working pressure of 160 pounds per square inch; they will be four in number, of the straightway fire-tube type. They will be about 11 feet 6 inches in diameter and about 19 feet 3 inches long. Each will contain three corrugated steel furnaces of 3 feet 8 inches internal diameter. The shells will be 1 inch in thickness. The tubes will be of mild steel, lap-welded or seamless drawn, 2¼ inches outside diameter. About one-quarter of them will be stay-tubes No. 6 B. W. G. thick; the remainder will be No. 12 B. W. G. The total heating surface will be about 10,797 square feet, and the total grate surface about 288 square feet.

All boiler-plate will be of mild, open-hearth steel; the rivets will be made by open-hearth or Clapp-Griffith's process.

The boilers will be placed in two separate water-tight compartments, with athwartship fire-rooms. Forced draft will be on the closed fire-room system, and each fire-room will be supplied with blowers of ample size.

There will be a main and auxiliary feed-pump in each fire-room and an auxiliary pump in each engine-room, the system being capable of supplying many times the maximum quantity of water the boilers can evaporate.

The auxiliaries will comprise evaporators, distillers, reversing and turning engines; pumps for feeding boilers and fire, bilge, flushing, and other purposes; ventilating and forced-draft fan-blowers; ash-hoists, electric-light, steering and anchor-hoisting engines, and workshop machinery.

The propellers will be of manganese bronze, three-bladed, built up so that the pitch may be altered or, if a blade is broken, replaced without removing the whole screw.

The machinery is shown in plates 42, 43, 44, 45.

STEAM-TUGS.

The appropriation for these vessels being very small, they will be built as cheaply as possible consistent with safety.

The machinery will consist of one vertical, direct-acting, triple-expansion engine driving a single screw.

The common practice of the principal builders of tug-boats has been closely followed, and, in addition, the specifications are so drawn that contractors may use patterns they have on hand which conform nearly to the design furnished by the Bureau.

The engines as designed have cylinders of 13, 20, 31½ inches diameter and 24 inches stroke, and are intended to develop about 350 I. H. P. at the maximum. There will be piston-valves for the high and intermediate pressure-cylinders, and a double-ported slide for the low pressure.

The valve motion is by the Stephenson link, the link being formed of double bars; there will be steam reversing-gear for quick handling.

The front columns of the engine will be of wrought iron, the back ones of cast-iron, resting on the condenser. The cross-heads are fitted with brass gibs lined with white metal and work on bar-guides.

The surface condenser is of cast-iron, and secured to the bed-plates. It has 600 square feet of cooling surface in brass tubes five-eighths inch outside diameter, fitted in brass tube-plates and packed with approved packing.

There will be an independent direct-acting air and circulating pump of approved pattern.

All the work about the engine will be of the most substantial character, and no cast or forged steel will be used except at the option of the contractor.

They will be supplied after completion with large wrecking and fire pumps, that the boats may be employed on either service.

Each boat will have one boiler about 11 feet mean diameter and 11 feet long. It will contain two corrugated furnaces of 42 inches inside diameter and will be sufficiently strong to safely carry a working pressure of 160 pounds to the square inch. The tubes will be 3 inches in diameter, and there will be about 1,350 square feet of heating surface and 49 square feet of grate. The material will be mild steel, the shell-plates $\frac{49}{64}$-inch thick, and the boiler will be tested with a pressure of 240 pounds.

The propellers will be of cast-iron, four-bladed, 7 feet 6 inches in diameter, 12 feet 6 inches pitch, and with a developed area of about 18 square feet.

The machinery is shown in plates 46, 47, 48.

ESTIMATES.

It is hardly probable that the appropriation for steam-machinery for the present year will be found sufficient, and an increase of $50,000 has been asked for the next year, and attention invited to the following:

The allowances for the various yards for labor from this appropriation are at present not sufficient to carry on all the work the Bureau has on hand, and still it is considerably more than can be allowed during the remaining months of the year.

It is feared that there may be some delay in completing the repairs to the *Chicago* and *Dolphin* for this reason, as the allowance to the New York yard can not be increased at this time and there is already important work on hand there that will require nearly the whole of it.

Other work at the Norfolk yard had to be stopped that repairs might be made to the *Richmond*, and this work can not be resumed until repairs have been made to the *Atlanta*.

The new vessels have double the number of main engines that the old ones had and a vastly greater number of auxiliaries; experience has proved that they require evaporators as well as distillers, and they are also furnished with refrigerating machinery. The contracts for only the later vessels call for these last two, and the earlier ones have to be supplied with them from the current appropriation. It must also be kept in mind that a triple-expansion engine, working at high speed and at high pressure, is a vastly different machine from the simple and compound engines of only a few years ago. In its manufacture many tools of new design, particularly for boiler-work, are employed; it requires a different and finer adjustment of its parts and an entirely different class of fittings and attachments.

Besides the main engines the auxiliaries of the new vessels require the greatest attention. Some of them are in constant use, and at the end of a year or two begin to require new parts to replace worn-out ones. In fact it may be said that these same auxiliaries cost as much, if not more, in labor and as much in repairs to keep them going as do the main engines. It is not generally remembered that the power of the auxiliaries on a ship like the *Baltimore* is nearly that of the main engines of a ship like the *Essex*.

The Bureau exercises the greatest care and economy in its expenditures, but is often hampered from lack of funds. It is hard to conceive how it could be otherwise with more than double the number of engines to care for on about the same appropriation it had formerly. It should also be kept in mind that the economy of a modern engine is not in its wear and tear account.

The new system of keeping time, making returns, etc., makes the services of an extra writer at the New York and Norfolk yards indispensable.

It is respectfully submitted that the salary of the chief clerk of a bureau in the Navy Department, with the duties and responsibilities, should not be less than that of chief clerks or heads of divisions in other bureaus of Executive Departments requiring no greater professional ability or technical knowledge, if as much, as is required in the proper performance of the duties of the chief clerk of this Bureau. In said other bureaus the salaries range from $2,000 to $2,500 per annum. For this reason, and believing that the requirements of this office are justly entitled to the increase of $200 per annum, I urgently recommend said increase, making the salary $2,000.

I earnestly recommend an increase in the salary for a chief draughtsman of $750, making $3,000 per annum in all, for the reason that it has been found that the services of a man with the professional ability to perform the duties of such office in the Bureau, with the rapid improvement in marine engineering, can not be obtained for the amount of $2,250 heretofore appropriated for the purpose.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the Bureau of Steam Engineering, Navy Department.

Detailed objects of expenditure, and explanations.		Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1890.
STEAM MACHINERY.				
For completion, repairs, and preservation of machinery and boilers of naval vessels, including cost of new boilers, distilling, refrigerating, and auxiliary machinery; preservation of and small repairs to machinery and boilers of vessels in ordinary, receiving and training vessels, repair and care of machinery of yard tugs and launches		$450,000	$700,000	$650,000
For purchase, fitting, repair, and preservation of machinery and tools in navy-yards and stations, and running navy-yard engines		40,000		
For incidental expenses of naval vessels, yards, and the Bureau, such as foreign postage, telegrams, advertising, freight, photographing, books, stationery, and instruments (act June 30, 1890)		10,000		
For purchase, handling, and preservation of all machinery and stores		200,000		
CONTINGENT.				
For contingencies, drawing-materials, and instruments for the drawing-room (act June 30, 1890)		1,000	1,000	1,000
SALARIES.				
Chief clerk (act July 11, 1890)		1,800	6,640	
Chief clerk (increase submitted)		200		
One clerk class 2 (act July 11, 1890)		1,400		
One clerk class 1 (same act)		1,200		
One assistant messenger (same act)		720		
Two laborers (same act)		1,820		
One chief draughtsman (act July 11, 1890)		2,250	5,400	
One chief draughtsman (increase submitted)		750		
One draughtsman (act July 11, 1890)		1,400		
One draughtsman (same act)		1,000		
		12,040	12,040	11,000
CIVIL ESTABLISHMENT.				
Navy-yard, Portsmouth, N. H.:				
Clerk to Department, per annum (act June 30, 1890)	$1,200			
One messenger (same act)	600			
		1,800	1,800	
Navy-yard, Brooklyn, N. Y.:				
Clerk to Department, per annum (act June 30, 1890)	$1,400			
One writer, per annum (same act)	1,000			
One messenger, per annum (same act)	600			
One writer, per annum (submitted)	1,000			
		4,000	4,000	
Navy-yard, League Island, Pa.:				
Clerk to Department, per annum (act June 30, 1890)		1,200	1,200	
Navy-yard, Norfolk, Va.:				
Clerk to Department, per annum (act June 30, 1890)	$1,300			
One messenger, per annum (same act)	600			
One writer, per annum (submitted)	1,000			
		2,900	2,900	
Navy-yard, Pensacola, Fla.:				
One writer, per annum (act June 30, 1890)		1,000	1,000	
Navy-yard, Mare Island, Cal.:				
Clerk to Department, per annum (act June 30, 1890)	$1,400			
One writer, per annum (same act)	1,000			
One messenger, per annum (same act)	600			
		3,000	3,000	
		13,900	13,900	11,900

Estimates of appropriations required for service of the fiscal year, etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1890.
INCREASE OF THE NAVY.			
Steam machinery:			
On account of steam machinery of new ships heretofore authorized by Congress (submitted)	$4,856,946	$4,856,946	....
IMPROVEMENT OF PLANT AT THE NORFOLK, VA., NAVY-YARD.			
Extra tools required to put the yard in condition for building and repairing modern marine machinery with economy and dispatch, including improvements in handling machinery and boiler-making plant, etc. (submitted)	49,205	49,205	
EXPERIMENTAL PURPOSES.			
For investigations with a view to increasing the efficiency of naval machinery in the matter of economy, lightness, and increasing power by systematic experiments with the various kinds of improved steam generators, engines, forced draught, propellers, materials of construction, and such other experimental work in connection with naval machinery as may be found expedient, including purchase of the necessary material therefor (submitted).	25,000	25,000	
	74,205	74,203	....

Very respectfully,

GEO. W. MELVILLE,
Engineer-in-Chief, U. S. N., Chief of Bureau.

Hon. B. F. TRACY,
Secretary of the Navy.

APPENDICES.

APPENDIX A.

NAVY DEPARTMENT, *Washington, July* 31, 1889.

SIR: A Board, consisting of yourself as senior member and Chief Engineer W. A. Windsor and Passed Assistant Engineers J. J. Barry and C. P. Howell, U. S. Navy, as members, is hereby appointed, and will assemble at such times and places as may be designated by you, for the purpose of making examinations of certain coil boilers and of witnessing and reporting upon the tests of the same. I inclose for the information of the Board copies of the advertisement issued by the Department under date of August 2, 1888, inviting proposals for furnishing coil boilers for the United States Navy, and of the circular embodying the conditions to be observed by persons submitting such boilers for competitive test, approved by the Department August 16, 1888, and have to inform you that after an examination of the plans submitted under the terms of said advertisement, the Department has decided that the boilers offered by Mr. Charles Ward, Charleston, W. Va.; Mr. William Cowles, New York; Mr. Frank B. King, Washington, D. C.; and the Hohenstein Manufacturing Company, of Newark, N. J., appear to possess sufficient merit to warrant the Department in testing them. The bidders above named have therefore been notified that if they wish their boilers tested they must, at their own expense, furnish the boilers and prepare them for test, either at their own works or at such other places as may be approved by the Department, and have been requested to communicate with you in regard to the places and manner of setting up their several boilers for test.

The Chief of the Bureau of Steam Engineering will furnish the Board with detailed instructions for conducting the tests and examinations of the boilers referred to, and, while it is expected that the Board will be guided in the performance of its duties by such instructions and by the advertisement and circular herewith transmitted, and, while the Department relies upon the discretion of the Board in making its examinations and report as full and complete as practicable, it is deemed proper that such report should show specifically the conclusions of the Board upon the relative merits of the several boilers as respects the evaporative efficiency, the dryness of the steam, the weight of the boiler, the weight of the contained water, the ease of making repairs, the simplicity and interchangeability of parts, the space occupied, the ease of firing and regulating the feed, the suitability of working in battery, the durability and the capability of long-continued steaming without cleaning.

The Board will keep a record, and report to the Department in detail the expenses of the test of each of said boilers, including the cost of the fuel used in such tests.

Very respectfully,

B. F. TRACY,
Secretary of the Navy.

Chief Engineer C. H. LORING, U. S. N.,
Navy-Yard, New York, N. Y.

APPENDIX B.

NAVY DEPARTMENT, BUREAU OF STEAM ENGINEERING,
Washington, August 24, 1889.

SIR: In compliance with the Department's order of the 31st ultimo, constituting a Board, of which you are senior member, to conduct a test of the boilers submitted under the terms of the Department's advertisement of August 2, 1888, and its circular of August 16, 1888 (copies of which are inclosed), as well as its instructions to the Bureau of the 31st ultimo, the Bureau presents the following instructions for the Board's guidance. The makers of the various boilers have been directed to notify you when their boilers will be ready and to arrange with you for the place of test. When the preliminaries have been settled you will assemble the Board in the place agreed upon and proceed with the tests. In making the tests you will be guided by the terms of the advertisement and circular referred to and by the inclosed instructions. Forms Nos. 80, 80-1, 80-2, 80-3, 80-4, and 80-5, except that the number and arrangement of the boilers, in the space allotted to them in the coast-defense vessel, are to be such that they are capable of furnishing enough steam, at 20 pounds per I. H. P. per hour, to exert 4,200 I. H. P. in triple expansion engines with a working pressure of 160 pounds.

A blue print of the new arrangement of the boiler compartment in the coast-defense vessel, showing the space available for coil boilers, has been forwarded to you. The manufacturers of two of the boilers which are to be tested have been requested to furnish you a copy of the boiler and arrangement in ship as already submitted to the Bureau. The other two (the Hohenstein Manufacturing Company, and Mr. F. B. King) have not submitted plans to suit the new arrangement of boiler space in the coast-defense vessel, but the Bureau has written them, asking that they furnish you with plans of the same nature as the first two above referred to.

While the calorimetric test for dryness of steam should be accurate, the Bureau believes that, as the tests are comparative rather than absolute, the ordinary "barrel calorimeter" will give results of sufficient accuracy for the purposes of these trials. You will obtain from each person or firm submitting a boiler for test a detailed statement of the expenses attending the test, which you will certify to be correct, if you are satisfied that said statement is fair and just.

The commandant of the New York yard will be directed to furnish the Board with the necessary outfit of instruments. To this end you are directed to prepare a list of all instruments you will need, examine the test outfit at the New York yard to see if they are all in hand, and if not to inform the commandant, so that requisition may be made upon the Bureau for those needed to supply deficiencies.

In each case when the Board is ready to conduct a test you will notify the commandant, so that he can ship the instruments to the place of test. After the completion of the test you will ship them to the New York yard.

It is anticipated by the Bureau that the results of these tests will be of great value, and you are therefore specially requested to spare no pains in making them reliable and complete in every particular.

Very respectfully,

GEO. W. MELVILLE,
Engineer-in-Chief, U. S. Navy, Chief of Bureau.

Chief Engineer CHAS. H. LORING, U. S. Navy,
Senior Member of Board for Testing Coil Boilers, Navy-Yard, New York.

APPENDIX C.

[Bureau Steam Engineering.—Form No. 80.]

INSTRUCTIONS FOR EVAPORATIVE AND CALORIMETRIC TESTS OF BOILERS.

General.—All dimensions and weights that may be obtained from drawings or by information will be verified, as far as possible, by actual measurement or weight. Detailed drawings, whenever they can be obtained, with the verified dimensions noted on them, will accompany the report of the Board.

The necessary instruments for the tests will be furnished by and returned to the Bureau of Steam Engineering.

The report, accompanied by a separate letter of transmittal, will be written in copying-ink, and submitted to the Bureau of Steam Engineering, the press copy to accompany the original.

Evaporative tests.—Before beginning the test, the boilers will be inspected to see that they are perfectly clean internally and without leaks. If small leaks unavoidably occur, the loss in water and heat will be accurately accounted for in the computations. All water supplied to the boiler will be carefully measured by means of two tanks, suitably connected and arranged, whose capacities have previously been accurately obtained, either by measurement or weight, or both.

The temperature of the water in these tanks will be taken at the top, middle, and bottom, as the water is pumped out. The time it takes to empty each tank will also be noted. When cold feed-water must be used, it should enter the tanks at the top and opposite to the suction of the feed-pump.

The fuel consumed during the test will be carefully weighed, the amount supplied being carefully noted at the receiving and checked at the delivery end. The weight of the dry refuse from it, in ashes, dust, and clinker, if any, will also be accurately ascertained and noted. When, in starting the second fire, wood and other substances are used, their value as fuel will be allowed for in the total quantity of combustible consumed at the rate of $\frac{4}{10}$ pound of coal per pound of wood. Then, from this quantity and the percentage of the dry refuse from fuel, the total quantity of fuel consumed will be calculated.

A statement of the kind and quality of the fuel, when and where obtained, and chemical analysis, if one can be or has been made, will be embodied in the report.

The data called for by form No. 80–1 will be accurately taken every thirty minutes. The steam pressure will be kept as steady as possible at 160 pounds by gauge, and regulated by means of the stop-valve.

After steam has been raised to the working pressure, the fires will be hauled and the grates and ash-pits quickly cleaned. Fires will then immediately be started with weighed fuel, the height of the water in the boilers carefully marked, the first full tank connected with the boiler through the feed-pump, the time noted, and the test considered as having commenced. During the test, the operation of the boiler and all other apparatus in use will be carefully and minutely observed and noted.

The evaporative test will continue for twenty-four consecutive hours. Should anything occur to interfere with the continuance of the test for this length of time, another test under these instructions will be commenced as soon as practicable.

During this test the forced-draft will be maintained at a pressure equal to 2 inches of water at the mouth of the ash-pit.

At the end of the test the conditions of fire and water level will be, as nearly as possible, the same as at the beginning.

Calorimetric tests.—During the trial frequent calorimetric tests of the steam will be made. The calorimeter should have at least 40 gallons capacity and be free from leaks. The platform scales should be carefully tested, and should be accurate to within $\frac{1}{100}$ of a pound. Steam will be taken by a well-covered 1-inch pipe from the center of the main steam-pipe, as near the boiler as possible, and led to the calorimeter. The pipe at the calorimeter end will be fitted with the short section of steam hose provided.

A high-grade thermometer will be fitted in the steam pipe as near as possible to the 1-inch pipe. Before turning the steam into the calorimeter the pipe must be blown through sufficiently long to clear it of all condensed steam and to heat it thoroughly.

The water admitted to the calorimeter should be of the lowest temperature obtainable, and the steam blown into it long enough to raise its temperature to about 110 degrees. The water should be continually agitated until the end, to insure a uniform temperature.

The openings in the top of the calorimeter will be as small as possible in order that evaporation may be reduced to a minimum.

A very small drain-cock will be fitted to the bottom of the calorimeter.

The data of the calorimetric tests will be accurately obtained and noted on the blank form No. 80–3, and the computations from them carefully made.

Special Tests.—The effect on the water in the boiler and on the fires and gases of combustion, under various pressures of forced draft (up to the highest safe limit) and the effect of suddenly closing the boiler stop-valve and opening it again after ten minutes, will be made the subject of special experiment after the evaporative test has been completed.

The report will include a general description of the hull, if the boilers are in a vessel, with such dimensions and facts as may be thought necessary or useful; a detailed description of the engines, if the boilers are in a vessel, with such weights, dimensions, and data of space occupied as can be obtained; details of propellers, if any; detailed description of the boilers and all special appliances with which they may be fitted, with all weights and dimensions, cubic space occupied by boilers, and space necessary around boilers to facilitate repairs, weight when empty, and with water to steaming level, the facility for repairs and renewal of parts, and liability to derangement; and the class of skilled labor required for the proper care of boilers when in use and for the necessary repairs.

The subject matter of the report will be arranged in the following order:

1. Preliminary statement of board in relation to carrying out instructions and arrangements made for the test.
2. Description and data of hull.
3. Description and data of engines.
4. Description and data of propellers.
5. Description and data of boilers and special appliances.
6. Fuel used.
7. Description of the manner of making the evaporative tests.
8. Data of these tests (form No. 80-1).
9. Description of the manner of making the calorimetric tests.
10. Data and computations of above (forms No. 80-2, 3, and 4).

11. Recapitulation (form No. 80–5).

12. Conclusions. Deductions from the results of the tests, and observations on the points referred to in the general and special instructions to the board, and such other observations or suggestions as the board may think necessary or useful.

Appendix A. Copy of orders convening board.

Appendix B. Copy of bureau's detailed instructions to the board.

Appendix C. Drawings, in the order of the subjects as previously given. Such other information as may be appended will follow Appendix C.

APPENDIX D.

COIL-BOILERS FOR THE UNITED STATES NAVY.

NAVY DEPARTMENT,
Washington, D. C., August 2, 1888.

The Navy Department, having in view the possible decrease in weight of machinery in vessels of war by the use of tubulous, sectional, or coil boilers, has determined to adopt such boilers, if suitable can be found, for a portion of the steam power of one or more of the vessels about to be built. To this end manufacturers who wish to offer such boilers for use by the Department are hereby invited to furnish plans of the same, adapted to an armored coast-defense vessel, on or before September 15, 1888. Plans must be accompanied by certificates that boilers of the same make are or have been in successful use at sea or on shore. Plans showing the space in the vessel available for boilers, particulars of the duty required, and other information, may be obtained upon application to the Bureau of Steam Engineering. The boiler which appears to the Department after investigation to be the best for the purpose, taking into account the evaporative efficiency, the dryness of the steam, the weight of the boiler, the weight of the water contained, the accessibility for repairs, the ease of making repairs, the simplicity and interchangeability of the parts, the space occupied, the ease of firing and of regulating the feed, the suitability for working in battery, the capability of long-continued steaming without cleaning, and the durability, will be adopted in the coast-defense vessel above mentioned, provided that the price, which must be stated when the plans are submitted, is satisfactory to the Navy Department. Such boilers as appear to possess merit will be tested by the Navy Department, if the manufacturers so desire, to determine which is the more suitable for the purpose. Manufacturers who wish their boilers to be tested must furnish a boiler of the type of one of those proposed for the vessel and prepare it for test, either at their own works or at such place as may be arranged with the Department. The expense of the test of the accepted boiler will be borne by the Navy Department, and the cost of the fuel used in the test of the second best will also be borne by the Navy Department. All other tests must be at the expense of the parties offering boilers for competition.

WILLIAM C. WHITNEY,
Secretary of the Navy.

APPENDIX E.

CIRCULAR EMBODYING THE CONDITIONS TO BE OBSERVED BY PERSONS SUBMITTING TUBULOUS, SECTIONAL, OR COIL BOILERS FOR COMPETITIVE TEST, IN PURSUANCE OF THE NAVY DEPARTMENT ADVERTISEMENT OF AUGUST 2, 1888.

On or before October 1, 1888, persons who wish to offer boilers in competition will furnish outline plans showing the boilers in place in the vessel for which they are intended—a blue print of the boiler compartments of which vessel accompanies this circular.

The coil or sectional boilers must be designed to furnish continuously, under forced draft, with due economy, at least three-fourths * of the steam necessary to work triple expansion engines of 4,800 I. H. P., at 160 pounds gauge pressure.

The boilers must be divided equally between the two boiler compartments. They will work in connection with the two cylindrical return-fire-tube marine boilers shown on the blue print.

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* Changed to seven-eighths.

In the port boiler compartment is shown the general arrangement of boilers, blowers, etc., which the Department prefers. [Two Ward boilers of size 0, No. 30, being taken as examples.] This arrangement of this or of any other type of boiler is not imperative, however, and may be changed as desired, provided that the following conditions be observed, viz:

(*a*) The bulk-heads of the boiler compartments, marked A A A, etc., can not be changed.

(*b*) The cylindrical return-tube marine boilers shown can not be placed further aft than their indicated position, but may be placed not more than 2 feet further forward.

(*c*) But if these boilers be moved forward, the coal-bunker bulk-heads, marked B B, must be changed so as to retain the same coal-stowage capacity.

(*d*) The fire-room hatch, smoke-pipe, and passageways to engine-rooms can not be changed.

(*e*) Provision must be made for easily getting coal out of the forward and after coal-bunkers into each fire-room, any passages for this purpose between boilers being not less than 3 feet wide and 6¼ feet high.

(*f*) There must be a fresh-water tank in each boiler compartment of sufficient capacity to hold water enough to fill the coil or tubulous boilers in that compartment to steaming level.

(*g*) There must be sufficient room around the coil or tubulous boilers to make such repairs as are likely to be needed, without removing any bulk-heads, or, to any great extent, parts of the boilers themselves.

(*h*) There must be sufficient room in each boiler compartment for a main and an auxiliary feed-pump, each of sufficient capacity to feed all the boilers in the compartment.

There must be noted on the plans submitted the following information:

Area of grate surface.

Area of heating surface.

Weight of boilers and fittings.

Weight of uptakes and boiler seatings.

Weight of water in boilers.

Center of gravity of boilers, etc., in steaming condition.

Proposed rate of combustion.

Proposed rate of evaporation per pound of coal from and at 212° F.

Total evaporation per hour from feed water at 120° F. to steam of 160 pounds gauge pressure which will be guaranteed.

Percentage of dryness of steam which will be guaranteed.

There must also be a drawing of one boiler in sufficient detail to permit of its construction being understood.

Persons submitting plans must, in order to have them considered, submit also sealed proposals for furnishing the boilers at the New York navy-yard within six months after receipt of an order for the same, including all fittings, complete and ready to be erected on board ship, and to receive steam, water and air connections. These bids must be accompanied by specifications stating just what is proposed to be furnished. These bids will be opened in the presence of competitors on October 1, 1888.

After an examination of the plans, those which appear feasible will be selected, and the persons offering them so notified. Such competitors as then wish to offer their boilers for test will be required to do so within three months from date of notice. The boilers offered for test must be of the type and approximately of the same size as those shown in the submitted plans and intended for the vessel. They must be fitted up complete for test at competitor's expense. For each boiler two tanks must be supplied, each of sufficient size to hold feed-water for at least 15 minutes' steaming—one for a measuring-tank and the other to feed from. Also, an accurate platform-scale, with a tank of about 50 gallons capacity, for calorimetric tests. Also, a platform-scale for weighing coal. All testing instruments will be provided by the Navy Department.

An evaporate test, of not less than twenty-four hours' duration, using clean fresh water, will be made at the rate of combustion proposed to be used on board the vessel, all feed-water being measured, coal weighed, and steam tested for dryness. Steam will be kept at 160 pounds pressure in the boiler and will be blown off at the stop-valve.

Boilers which give good results in evaporation will be further tried by being surrounded by walls (rough boards will be sufficient) representing the adjacent bulk-heads on board ship, and, thus limited in room, the various joints of the boiler will be made and unmade, tubes or coils taken out and put in, etc., to prove that repairs can be properly made in the space available.

Satisfactory proof must be made that the boilers can be worked together in battery and in connection with ordinary marine boilers.

The boiler which, after the above specified tests, may be selected as the best for the purpose intended, will, if considered necessary, be further subjected to a test to show whether or not it will work satisfactorily under the every-day conditions existing on board ship, with such feed-water as is obtainable after continued steaming, charged with grease, etc., from the engines.

Sufficient means must be provided for thoroughly cleaning the heating surfaces when using dirty coal.

The boilers made for use on board ship must be of domestic manufacture.

Either New River or George's Creek bituminous or anthracite coal will be used in the tests.

WILLIAM C. WHITNEY,
Secretary of the Navy.

NAVY DEPARTMENT,
Washington, D. C., August 16, 1888.

APPENDIX F.

REPORT OF THE BOARD OF ENGINEER OFFICERS OF THE NAVY TO TEST THE TUBULOUS BOILERS SUBMITTED IN ACCORDANCE WITH THE PROVISIONS OF THE NAVY DEPARTMENT'S CIRCULAR, DATED AUGUST 2, 1888.

OFFICE OF EXPERIMENTAL BOARD,
Navy-yard, New York, February 28, 1890.

SIR: Conforming to the directions of the honorable Secretary of the Navy, under date of July 31, 1889, and the instructions of the Bureau of Steam Engineering of the 24th of August following, reference No. 2373–J. J., the Board appointed for the purpose of making examinations of certain coil boilers and of witnessing and reporting upon the tests of the same, assembled on the 10th day of December last at the works of Charles Ward, esq., in Charleston, W. Va., where he had under authority set up one of his boilers for such examination and test. We found there a very complete and well-arranged plant installed in a building erected for the purposes of this test, for the accurate and convenient execution of which nothing whatever was lacking, either in the appliances or the temper and disposition of the proprietor or his employés.

This plant included two cylindrical iron feed tanks of large dimensions. One was placed somewhat above the level of the ground and through its bottom, the interior was connected by a suitable pipe with the feed pump. This was called the feed tank. Above and back of this tank was placed the measuring tank. When filled to the height of the lower sides of three rectangular slits cut equidistant in its circumference near the top, it was found to contain by the scales, 4,413 pounds of water at a temperature of 56° F. Corrected for the mean temperature of the feed water during the tests, 50.4°, this weight becomes 4,414.4 pounds, which is the weight used in the computations. All parts of these tanks, their pipes and cocks, and the feed apparatus throughout, were in full view; all leaks were therefore visible. There were but two, the water from these being caught and returned to the feed tank. The supply of water (always sufficient) came from a large elevated tank, kept full by a steam-pump on the river bank. A double-acting Blake plunger pump served the feed. Its plungers have a diameter of 4¼ inches and a stroke of 10 inches.

The blower is of Sturtevant's make, its runner being 49 inches in diameter. Its blades have a radial length of 12⅝ inches and an inner width of 23¼ inches, tapering to 19¼ inches at the periphery. The inlets are 27¼ inches in diameter and the outlets 23¼ inches square. The air duct was somewhat larger. The blower was driven by an engine belonging to the works, by a belt, the diameter of the engine pulley being twice that of the blower. The air from the blower was discharged into an air-tight fire-room, which inclosed one-half of the circumference of the boiler for a height of about 7¼ feet, the height of the fire-room. The floor space beyond the boiler was 13 by 9 feet. The air duct entered on one side of the boiler, the lower edge of its section being at the level of the floor. The air lock was shut off from the fire-room by a flap door opening upwards, and from the outside atmosphere by a sliding door. Within the air lock was the scale for weighing the coal.

The pyrometers, two in number, were placed in the smoke-pipe at right angles with each other and about 2 feet above the central drum of the boiler. The thermometer in the steam-pipe stood in a bath of oil and was covered in that part projecting above the pipe.

The calorimeter was of the ordinary barrel variety, fitted with an agitator for equalizing the temperature of the water within it. Steam came to it through a pipe about 10 feet long, which was well protected against loss of heat by radiation. It got its steam through a perforated tube inside the steam-pipe close to the boiler.

The boiler used in the test, of which drawings are appended marked 1 and 2, is in size and proportions the nearest in the catalogue of the maker to that which he proposes for the purposes of the Navy Department. It has a plate-iron central drum standing vertically in the center of the system and extending from beneath the grate to about 11 feet 6 inches above the base line. It receives all the feed water from an inside pipe that passes through its bottom and extends to near the water-line. The space above the water-line forms practically all the steam room. Surrounding this drum in nearly concentric circles are eight separate coils or sections, varying equally in dimensions from 36 inches, that of the inner one, to 110 inches, that of the outer one. Each section has thirty tubes or complete circles, in all 240. The tubes of each section are connected in half circles by screwed joints to two vertical headers diametrically opposite to each other. The tubes are 2 inches in external diameter and are set at an angle of about ten degrees with the horizontal, to give direction to the current of circulation within them. The headers carrying the lowest ends of the half circles have a common connection at their bottom ends with a manifold, which at its inner end is connected with the central drum. Through this manifold they are supplied with water. Their upper ends are closed.

The headers carrying the highest ends of the half circles connect with a manifold at their tops, through which all steam generated passes into the upper end of the central drum. At their bottom ends they connect with a manifold which serves as a mud-drum and as a blow-off for purging the boiler. The headers proper do not extend below the level of the circular tubes, the connections with the lower manifolds being through iron pipes, 3½ inches in diameter, screwed into the bottom ends of the headers and joined to the manifolds by shallow stuffing-boxes. These manifolds are beneath the grate, and they and the headers are of cast-steel. The grate is an annulus and has an area of 66.5 square feet. This was reduced to 53 square feet for the test, by bricking, for convenience of manipulating the fires.

The total heating surface measured on the exterior of the tubes, headers, and drum is 2,490 square feet; measured on the interior it is 2,074.5 square feet. A portion of this heating surface was, however, covered by the bricks laid on the grate, so that the area of the superfices was reduced to 2,473.5 and 2,060 square feet, respectively. These are the figures used to represent the heating surface on form 5 and in Table 2. About 30 per cent. of this heating surface is above the level of the mean water line. Undoubtedly there is always, when the boiler is under forced draft, a very large amount of water circulating through these upper tubes and receiving steam-producing heat from them; but it is impossible to establish their exact value as water-heating surfaces. As it is probable that all the boilers tested by this board will be similar in this particular, comparisons may be justly made by the use of the total heating surface for the purpose of the above-mentioned table, at least when no superheating is apparent.

The greatest diameter of the outer casing is 10 feet 3 inches; the diameter of the outer casing around the drum above tubes, 4 feet 6 inches; and diameter of smoke-pipe, 3 feet 4 inches. The height from base to top of drum casing is 11 feet 8 inches, and from base to top of casing around tubes, 8 feet 2 inches. The light iron casing that envelops the furnace and tubes is lined at the furnace level with fire-bricks, above that, with curved tiles hollowed in the back.

The weights furnished us in detail, as from actual weighing and verified as far as possible by our calculations, are, for the boiler, tested, as follows:

	Tons.
Empty boiler, exclusive of smoke-pipe	$11\frac{1833}{2240}$
Boiler with water to first gauge	$13\frac{1351}{2240}$
Boiler with water to second gauge	$13\frac{1923}{2240}$

The weight of the contained water was obtained by pumping it from the tanks to a known quantity.

The boiler was entirely new, perfectly tight, and had been cleansed by boiling in it water containing a detergent. The coal used was that of the Nuttalburgh Coal & Coke Co., of Nuttalburgh, Fayette County, W. Va., which we understand is in the New River district. The company furnished the following as an analysis of this coal, made by Dr. Thomas Eggleston, of Columbia College, New York City:

	Per cent.
Fixed carbon	70.67
Volatile matter	25.35
Sulphur	0.57
Moisture	1.35
Ash	2.10

Under pressure it burns with an intense whiteness, and swells and cokes in the furnace. It requires but little manipulation in the furnace, and the fires were not cleaned during either day of the trials. It gives off dense smoke, and at night a dull red flame 15 feet high is visible. Whatever coal fell through the bars, burned in the ash-pits. The clinker at the end of the runs was light and friable, not adhering to the grate. There was no evidence of ashes going up the chimney, but at times, showers of minute particles of coke fell all around the grounds.

Short preliminary runs were made during portions of three days preceding those of the trials of record, for the purpose of educating the attendants and the firemen in their duties, and of familiarizing ourselves with the round of operations. The tests of record were made on the 18th and 19th of December, in two separate and distinct runs of twelve hours each, and in the following manner:

With cold water in the boiler, a wood fire was started and continued until steam at 160 pounds had blown off for about ten minutes. The embers were then hauled and, with 200 pounds of wood, a new fire was started, the height of the water in the gauge-glass marked, and the trial held to have commenced. The blower was run slowly until the coal was well ignited and then at full speed. The record of the water used was made when that emptied from the measuring tank had been pumped into the boiler. At the end of the test the water remaining in the feed-tank after bringing the height in the gauge-glass to the original place, was deducted from the quantity of record.

The feed-water temperatures were obtained from the feed-tank. The coal was filled into a barrow on the platform scales in the air-lock, to a fixed weight, tallied and dumped, without wheeling, into the fire-room. This operation for the larger part of the time was under the observation of a member of the Board. The air pressure was maintained constant by slight variations in the speed of the blower engine. When nearing the end of a run, the fire was allowed to burn down, the blower being gradually slowed until nothing was left but clinkers giving off little heat. When no more steam formed, the trial came to an end.

The steam generated was blown into the atmosphere through a screw-stop valve, the hand wheel of which was the exclusive charge of an attendant, who regulated the flow to maintain a constant pressure of 160 pounds by gauge. The data of the runs of record will be found in the appended tables, Form No. 80-1, marked 1*a* and 1*b* for the respective days.

The calorimeter tests were made at regular hourly intervals, all usual and necessary precautions being observed. The water in the barrel was well agitated and the top of the latter covered. The hose was heated before being placed in the barrel, and accuracy in weight obtained by the use of counter-weights of one-tenth of a pound each. The data and computations of these tests will be found in the appended tables, Forms Nos. 80-3 and 80-4, and in accordance with Form No. 80-2. A recapitulation of the results, also appended, will be found on form No. 80-5.

A pressure of only 2¼ inches of water could be maintained in the fire-room. Under this the boiler showed no peculiarity of action. It was not found possible to hold the boiler pressure constant for ten minutes with the valve closed, so sensitive is the boiler to changes of manipulation. It was so held for four minutes; the stop-valve was then suddenly opened and the water rose ten inches in the glass and then out of sight. On closing the valve suddenly, the water reappeared with little apparent loss of height, and with no other effect.

Battens were set up above the boiler to correspond to the height of the lower edge of the deck beams from the boiler seating, as shown on the drawing furnished by the Bureau. (*See* Plate 5.)

The center coil of the series was then lifted to this height, and it was apparent that in this position all the tubes, save the lower one, could be removed and replaced. The coils can also be lowered into the furnace, giving opportunity to reach and work upon the lower half of the tubes from there. The upper part of the boiler was stripped, the connections broken, and the center coil hoisted by six or seven men in about four hours. No space around the boiler is required for repairs except to the outer casing. If this were made of galvanized material, perhaps a little heavier than is now used, and kept well painted, it would undoubtedly endure a cruise.

The boiler especially designed for the coast-defense vessel is no higher than this one, and all repairs can be easily and expeditiously done within the space allowed and by the better class of men ordinarily found in fire-rooms of our war-vessels. Repairs to the central drum should be excepted, as these would possibly require the services of a boiler-maker. Spare parts could easily be stowed on board and attached with the minimum of mechanical skill. There are no special appliances used with this boiler, and its peculiarities have been fully described.

From the small amount of water the boiler contains close attention must be paid to the feeding, which is the only special requirement in its management. The very considerable amount of moisture in the steam, as shown by the calorimeter tests, was not evident by any effect produced in the blower engine or feed pump, or in the cylinder of the large steam pump on the river bank, the steam for all of which came from the main steam-pipe of this boiler. The steam to the pump on the river was led through an uncovered pipe 200 feet long. To the unaided senses the steam seemed dry, except for an occasional appearance of water at the discharge of the blow-off pipe. The results of the calorimeter tests, however, suggest the necessity of attaching an ample separator to each boiler. No difficulty need be anticipated in the attempt to work boilers of this type in battery, as it has already been done in several instances, and there is no reason to suppose that they will not work equally well "in connection with ordinary marine boilers."

The design of boiler which is offered for use in the coast-defense vessel, drawings of which are appended to this report, marked 3 and 4, differ from the one tested only in these few particulars. It has one additional coil or section, which increases the external diameter to 11 feet 1 inch, the unbricked or useful grate surface to 67 square feet, and the heating surface to 2,938 square feet. Its steam manifold is enlarged in its diameter to 10 inches, increasing the area of cross section per square foot of heating surface 30 per cent. This ought to improve the character of steam in the matter of moisture. The boiler tested evaporated into useful steam, 16,843 pounds of water per hour, which at 20 pounds per hour per horse-power would produce 842 horse-power.

Assuming that the evaporation by boilers of this type, in which essential proportions are maintained, is in the direct ratio of their heating surfaces, the proposed boiler should produce under such conditions as prevailed during our trial, steam for 1,000 horse-power. Had the water that left the boilers with the steam blown out, been trapped into the feed-tank without losses of any kind, the heat thus saved would have raised the evaporation to that required for 872 horse-power. Under similar conditions the proposed boiler would produce steam for 1,039 horse-power. We are of the opinion that no larger performance than this can be realized from the proposed boiler under any conditions possible on board ship. Four boilers of the dimensions shown on the drawing appended can be conveniently placed in the space allotted them in the ship (*see* Plate 5), and so conform to the terms of the circular regarding the getting out of coal from bunkers.

Since commencing the preparation of this report, it has come to our knowledge that a boiler of this type has been damaged by the bulging of its central drum at the furnace level, presumably from lack of water contact at this highly heated place. We are of opinion that this may be avoided by the introduction of a tube within the drum, say of 4 inches less diameter than the drum, extending from the grate level to just below the normal water-line. The increased rapidity of the circulation produced by this means, along the inner surface of the drum, would sweep off the particles of steam as soon as formed and insure water contact.

Tabulated statements, properly certified, of the labor and fuel expended during the days that steam was raised under our observation, are appended and marked D and E.

Very respectfully,

CHAS. H. LORING,
Chief Engineer, U. S. N.,
GEO. W. MAGEE,
Chief Engineer, U. S. N.,
J. J. BARRY,
Passed Assistant Engineer, U. S. N.,
CHAS. P. HOWELL,
Passed Assistant Engineer, U. S. N.

Engineer-in-Chief GEORGE W. MELVILLE, U. S. N.,
Chief of Bureau of Steam Engineering, Washington, D. C.

The estimated weight of the boiler proposed by Mr. Ward for the coast-defense vessel was given by the Board in a supplementary report, as follows:

	Tons.
Weight of empty boiler	$13\frac{1398}{2240}$
Weight with water to first gauge,	$15\frac{1397}{2240}$
Weight with water to second gauge	$15\frac{1445}{2240}$

FORM NO. 80-1, TABLE 1a.—*Log of evaporative test of the Ward boiler, on the 18th of December*, 1889.

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer in inches of mercury.	Pounds of fuel consumed.	Pounds of dry refuse.	Pounds of water fed to boilers.	Temperatures.					Air-pressure in inches of water.	Revolutions of blowing engines.	
							Feed-water, t_1.	Steam by thermometer, at boilers.	In uptake.	Atmosphere.	Fire-room.		Engine.	Blower.
1	12	160	29.40	*80	......	13243.2	52	360	788	66	70	2	250	500
2	1.00	160	29.40	3,000	......	17657.6	51	360	826	67	70	2	300	600
3	2.00	160	29.40	......	......	17657.6	51	358	841	69	71	2	302	604
4	3.00	160	29.40	......	......	17657.6	51	358	823	69	74	2	294	588
5	4.00	160	29.35	6,250	......	22072.0	51	357	924	69	75	2	285	570
6	5.00	160	29.40	......	......	22072.0	51	360	912	68	74	2	285	570
7	6.00	160	29.40	7,500	......	22072.0	50.5	359	835	68	77	2	275	550
8	7.00	160	29.40	......	......	17657.6	50.25	360	821	68	73	2	280	560
9	8.00	160	29.40	8,000	......	22072.0	50.5	366	927	65	71	2	277	554
10	9.00	160	29.40	......	......	17657.6	50	370	897	60	70	2	275	550
11	10.00	160	29.40	......	......	22072.0	50	369	922	61	71	2	285	570
12	10.35	160	29.40	8,000	15.90	8828.8	50	367	820	62	74	2	200	400
Means and totals...			29.3958	32,830	15.90	220,720	50.7	362	861	66	72.5	....	275.666	551.333

* Wood.

FORM NO. 80-1, TABLE 1b.—*Log of evaporative test of the Ward boiler on the 19th of December*, 1889.

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer in inches of mercury.	Pounds of fuel consumed.	Pounds of dry refuse.	Pounds of water fed to boilers.	Temperatures.					Air-pressure in inches of water.	Revolutions of blowing engines.	
							Feed-water, t_0.	Steam by thermometer, at boilers.	In uptake.	Atmosphere.	Fire-room.		Engine.	Blower.
1	10.00	160	29.45	*80	......	4414.4	50.00	362	860	57	74	2	270	540
2	11.00	160	29.50	......	......	22072.0	50.00	364	910	63	75	2	293	586
3	12.00	160	29.45	9,250	......	17657.6	50.00	366	920	69	77	2	287	574
4	1.00	160	29.45	......	......	22072.0	50.25	370	867	69	77	2	275	550
5	2.00	160	29.40	......	......	22072.0	51.00	368	972	72	79	2	262	524
6	3.00	160	29.40	9,750	......	22072.0	51.00	365	925	73	80	2	280	560
7	4.00	160	29.45	......	......	22072.0	50.50	367	930	71	81	2	260	520
8	5.00	160	29.45	......	......	22072.0	50.50	367	920	67	80	2	265	530
9	6.00	160	29.45	10,000	......	17657.6	50.00	367	908	67	79	2	272	544
10	7.00	160	29.45	......	......	22072.0	50.00	367	905	68	78	2	260	520
11	8.00	160	29.45	......	......	17657.6	49.75	367	850	65	75	2	264	528
12	9.00	160	29.45	......	......	22072.0	49.25	368	885	67	75	2	260	520
13	9.33	160	29.45	8,112	1,798	7201.6	49.00	......	......	61	75	1	......	......
Means and totals.			29.446	37,192	1,798	241,164.8	50.70	366.5	903.606	66.846	77.307	....	270.666	541.333

* Wood.

FORM No. 80-2.—During the trial twenty-three calorimetric tests were made, the quality of the steam being calculated by the formula:

$$Q = \frac{1}{l}\left(\frac{W}{w}(h' - h) - (T - h')\right)$$

Q = quality of steam, dry saturated steam being unity.
W = weight of water originally in calorimeter.
w = weight of water added to W by condensed steam.
T = total heat of water, due to observed pressure of steam.
l = latent heat of steam at observed pressure.
h = total heat of water of initial temperature t in calorimeter.
h' = total heat of water of final temperature t' in calorimeter.

The observed data and computed results are given in the following tables, Nos. 3*a* and 3*b*, the various quantities having been taken from Peabody's tables.

NOTE.—The greater the weight of condensed steam (*w*), the smaller will be the percentage of error in the value of Q, other things being equal.

The importance or weight of an error in any one of the observed readings, the others being correct, increases in the following order:

P, W, *t*, *t'*, *w*.

FORM No. 80-3, TABLE 3*a*.—*Log of calorimetric tests of the steam from a Ward boiler, made at Charleston, W. Va., on the 18th of December, 1889.*

No. of test.	Time.		Average pressure of steam in pounds absolute.	Weights.					Temperature.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.	P.	Calorimeter. *b*.	W+*b*.	W.	W+*b*+*w*.	*w*.	*t'*.	*t*.		
									°F.	°F.		°F.
1	11.16	11.31	174.4	82	396.8	314.8	414.6	17.8	114	54	.93710	360
2	12.14	12.33	174.4	82	407.7	325.7	425.8	18.1	114.3	52.8	.98132	360
3	1.18	1.35	174.4	82	406.9	324.9	425.7	18.8	113	53	.90730	358
4	2.14	2.35	174.4	82	407.9	325.9	426.3	18.4	111.2	52.2	.91469	358
5	3.20	3.37	174.4	82	404.2	322.2	422.1	17.9	110	52.2	.90777	357
6	4.25	4.43	174.4	82	404.3	322.3	423.3	19.0	111.7	50.8	.88590	360
7	5.16	5.31	174.4	82	405.0	323.0	423.6	18.6	110.6	51.2	.90765	359
8	6.15	6.30	174.4	82	404.4	322.4	424.4	20.0	114.8	52.5	.87128	360
9	7.20	7.39	174.4	82	404.4	322.4	423.2	18.8	110.2	51.6	.86654	365
10	8.20	8.36	174.4	82	405.0	323.0	424.7	19.7	111.8	51.5	.84973	370
11	9.12	9.26	174.4	82	403.4	326.4	428.2	19.8	110.2	51.8	.81730	369
12	9.55	10.10	174.4	82	415.6	333.6	436.1	20.5	118.2	52	.85069	367
	Mean values of Q and temperature										.88385	362

Percentage of moisture in the steam, 100 (1-Q), 11 615.

TABLE 3*b*.—*Log of calorimetric tests of the steam from a Ward boiler, made at Charleston, W. Va., on the 19th of December*, 1889.

No. of test.	Time.		Average pressure of steam in pounds absolute. P.	Weights.					Temperature.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Calorimeter. *b*.	W+*b*.	W.	W+*b*+*w*.	*w*.	*t'*.	*t*.		
									°F.	°F.		°F.
1	9.55	10.14	174.4	82	413	331	433.4	20.4	112.2	50.3	.89604	363
2	10.55	11.13	174.4	82	410	328	429.3	19.3	113.8	53.7	.89029	364
3	12.00	12.17	174.4	82	405.5	323.5	424.6	19.1	112.0	54.0	.84256	366
4	1.00	1.20	174.4	82	407	325	426.8	19.8	113.8	53.8	.84818	370
5	2.00	2.20	174.4	82	405	323	424	19.0	112.2	55.0	.83051	368
6	3.00	3.18	174.4	82	405	323	424.6	19.6	112.8	53.2	.84258	365
7	4.00	4.15	174.4	82	405.4	323.4	423	17.6	110.0	52.7	.92282	367
8	4.57	5.14	174.4	82	408.5	326.5	427.5	19.0	111.4	53.0	.86624	367
9	6.25	6.40	174.4	82	430	348	449	19.0	109.5	54.3	.87305	367
10	7.18	7.32	174.4	82	405	323	424.6	19.6	112.0	52.2	.84627	367
11	8.25	8.42	174.4	82	405	323	423.6	18.6	110.8	52.6	.87363	367
Mean values of Q and temperature											.86651	366.66

Percentage of moisture in the steam, 100 (1—Q), 13.349.

FORM No. 80-4.—From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, *P*	174.4
Average temperature of the feed-water, t_1	50.4
(*a*) Number of pounds of water vaporized, $W_1 \times Q$	404,232.0
(*b*) Number of pounds of water carried over with the steam, $W_1 (1-Q)$	57,652.4
Total heat of steam at pressure *P*	1,194.88
Total heat of water at temperature t_1	18.504
(*c*) Units of heat required to vaporize one pound of water from a temperature t_1 and under a pressure *P*	1,176.376
(c^1) Units of heat required to raise the temperature of one pound of water from t_1 to the temperature due to the pressure *P*	324.196
(*d*) Units of heat required to vaporize one pound of water from and at a temperature of 212° and under atmospheric pressure	965.80
Total heat required to vaporize the water, $a \times c$	475,528,823.2820
Total heat required to raise the temperature of the water, $b \times c^1$	18,690,677.4704
(*e*) Total heat obtained from the fuel, as measured by the steam discharged	494,219,500.7024
(*f*) Units of heat obtained per pound of fuel	7,058.0693
(*g*) Units of heat obtained per pound of combustible	7,416.9268
$\frac{f}{c}$ Potential evaporation per pound of fuel, from a temperature t_1 and under a pressure *P*	5.99983
$\frac{g}{c}$ Potential evaporation per pound of combustible, from a temperature t_1 and under a pressure *P*	6.30489
$\frac{f}{d}$ Equivalent potential evaporation per pound of fuel, from and at a temperature of 212° and under atmospheric pressure	7.30799
$\frac{g}{d}$ Equivalent potential evaporation per pound of combustible from and at a temperature of 212° and under atmospheric pressure	7.67957

FORM No. 80-5, TABLE 5.—*Recapitulation of the results of the evaporative and calorimetric tests of the Ward boiler at Charleston, W. Va., December* 18 *and* 19, 1889.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

TOTAL QUANTITIES.

Duration of test, in hours, two of twelve hours each	24
Fuel (Nuttallburgh, New River) consumed	70,022
Refuse from fuel, in dry ashes, dust, and clinkers	3,389
Combustible consumed	66,633
Water fed to boiler, by tank measurement, W_1	461,884.6
Per cent. of the fuel in dry refuse, etc	4.8384

AVERAGE QUANTITIES.

Temperature of feed water, t_1	50.4
Temperature of steam, by thermometer	364.33
Temperature of uptake	382.833

Temperature of atmosphere	72.48
Temperature of fire-room	75
Barometer, in inches of mercury	29.4205
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, 14.7+ pressure by gauge, in pounds, *P*	174.4
Pressure of steam at engine, in pounds per square inch above a perfect vacuum	
Air-pressure, in inches of water, in fire-room	2
Air-pressure, in inches of water, at	
Revolutions of blowing engines, per minute	273.166
Revolutions of blower, per minute	540.333

Rates of combustion.	Pounds of fuel.	Pounds of combustible.
Amount consumed per hour	2,917.5833	2,776.375
Amount consumed per hour per square foot of grate-surface (53)	55.0487	52.3844
Amount consumed per hour per square foot of heating surface (exterior)	1.1795	1.1224

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature t_1 and under a pressure *P*	6.5963	6.9318
Equivalent apparent evaporation from and at 212° and under atmospheric pressure	8.0345	8.4429
Actual evaporation, into steam of quality *Q*, from a temperature t_1 and under a pressure *P*	5.7729	6.0665
Equivalent actual evaporation from and at 212° and under atmospheric pressure	7.0314	7.3890
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature t_1 and under a pressure *P*	5.9986	6.3037
Equivalent potential evaporation from and at 212° and under atmospheric pressure	7.3063	7.6779

APPENDIX G.

OFFICE OF EXPERIMENTAL BOARD,
Navy Yard, New York, May 17, 1890.

SIR: The Board appointed by the honorable Secretary of the Navy, under date of July 31, 1889, assembled at the navy-yard, New York, on the 25th of March last, where Mr. William Cowles had set up one of his "water tube boilers" under authority, and proceeded to the examination, and ultimately the test of it, under the terms of the honorable Secretary's order, and the instructions of the Bureau of Steam Engineering, dated 24th August, 1889. We have respectfully to present the following as our report of the results of this examination and test:

The boiler submitted for this purpose is so fully exhibited on the accompanying drawings (Plates 6 and 7), that the general description of it herein seems superfluous. Its principal exterior dimensions are, length (athwartships), 11 feet 5 inches; breadth, 7 feet 9 inches, and height, extreme, 12 feet 1¾ inches. Originally the heating surface was 2,185 square feet, 30 per cent. of which lay above the mean water level. As, however, all the regular tubes (as the designer calls those between the drums) are beyond question filled with water circulating through them when the boiler is in use, we designate only as superheating surface that of the top of the shell and the superheaters proper. The combined area of these is 8¼ per cent. of the total original heating surface.

During one of the early days of the trial one of the "b" tubes (see drawing "Detail of furnace tubes," Plate 8) burst just below the first bend, and an examination of its fellows showed that they had not been sufficiently supplied with water, undoubtedly because the lower manifolds were not of sufficient cross-section. Two sets of tubes of unequal length took their water from these manifolds, the shorter ones getting the most of it. All the longer ones, thirty-four in number, were therefore cut out before the tests of record began. It was also apparent after a trial or two, that the area for draft between the tubes was insufficient, and thirteen of the regular tubes were removed. These removals reduced the heating surface to 2026.75 square feet, increasing the percentage of superheating surface to 9.43. The grate area is 47 square feet. The ratio of grate to heating surface is 1 to 43.12. Kirkwood's rocking grates were fitted to the boiler, but after the closed fire-room was abandoned, *i. e.*, during the tests of record, they were but little used as such.

	Tons.
The weight of the boiler (estimated) is	9.75
Actual weight of water to second gauge is	1.8
Total	11.55

Before removal from the yard this estimated weight will be corrected by the scales. The boiler was new, never having had steam on before being brought to the yard. A single leak was observed, so slight in quantity, however, as to have no significance. The smoke-pipe was led horizontally 25 feet, its end turned upward, being about 20 feet above the grate. The air-duct entered the ash-pit on one side. Open dead plates admitted air between the plates of the furnace doors, keeping them quite cool. A damper in the duct was used to shut off the air supply when the furnace doors were open, the blower being slowed also. A light iron casing, stiffened with angle irons, surrounds the steam generating and heat-containing portions of this boiler. It is lined with refractory material, tiles, magnesium, and asbestos boards. The top over the "regular" tubes can be easily removed, and through the opening so made any of those tubes can be passed in or out. It was through this opening that eighteen of the "regular" tubes previously referred to were taken out of the boiler after the test. The *a*, *b*, *c*, and *d* tubes come out through the furnace.

The plant used for the tests is that which has been for many years in the foundry building of steam engineering. Its two tanks are of large capacity, the measuring tank holding when filled to the lower edge of the weir, 8,990.15 pounds of water, corrected for the temperature of the feed. Their contents at different levels were ascertained by weighing into them successive 400-pound quantities, the levels after each weighing being marked on a batten. A No. 5 Blake pump served the feed easily. The blower used was of Sturtevant's make, its engines coupling direct to the runner shaft. The runner is 48 inches in diameter and has ten blades, each of which is 13¾ inches wide at the periphery. Its speed of revolutions was very variable as it was slowed when the furnace doors were opened. Its mean revolutions when in full operation were 380 per minute.

The calorimeter was of the ordinary barrel variety. Its steam came to it through a 1-inch pipe about 8 feet long, well covered. Steam entered this pipe from a 1-inch tube, suitably perforated, that entered the main steam-pipe close to the boiler in a lower quadrant and passed across it at an angle of 45 degrees. The steam-pipe thermometer stood in a bath of oil placed close to the calorimeter tube. Its projecting part was covered to protect it from the radiations from the uptake. Two pyrometers were placed in the smoke-pipe in the same plane and nearly at right angles with each other. There was a nearly constant difference in their readings of about 50 degrees. The means are given in the tables.

The coal was bought as George's Creek. No analysis of it could be had. A considerable portion of the refuse was combustible. It was difficult to handle in the furnace under the conditions, as it swelled greatly in burning, preventing the firemen from throwing fresh fuel to the back of the furnace until it had been broken down. This process required frequent openings of the furnace doors, and a consequent reduction of the strength of the blast from the blower. Observations showed that the damper in the air-duct was closed about 8 per cent. of the time. There was no clinker in the refuse.

Short preliminary runs were made through two days for the purpose of educating the attendants in their round of duties, but it was many days after that the satisfactory runs of record were made. Twice tubes split, putting an end to the runs. Once it became evident after five or six hours that a very insufficient amount of coal was being burned, and the day was lost. Twice the firemen that had been engaged failed to appear. Changes made after the incidents named that affected the boiler consumed many days, and only on the 28th of April was the first successful run made, followed by another (deferred for one or more of the causes named above) on the 8th of May. The routine of the tests was as follows:

A wood fire was started and continued until steam at 160 pounds had blown off for some minutes. The embers were then hauled and a new fire started, the height of the water in the gauge glass marked, and the trial held to have commenced. The wood was entered in the table at four-tenths its weight. The speed of the blower was gradually increased as the fire required, until the 2″ of water column was attained. The record of the water was made when the measuring tank was emptied. At the end of the test the water remaining in the feed tank, after bringing that in the boiler to the original height in the glass, was deducted from the quantity last recorded. The feed-water temperatures were taken from the feed tank. The coal was filled into a barrow on a platform scale to a fixed weight, 300 pounds net, and tallied by a member of the Board. Slight variations in the speed of the blower engines maintained the air-pressure constant. When nearing the end of the run the firing was discontinued, the blower gradually slowed until the fire had so far burned out that no steam was formed, and the trial then came to an end. The steam generated was blown into the atmosphere through a screw stop-valve, the hand-wheel of which was controlled by an attendant, who regulated the flow to maintain a constant pressure of 160 pounds per gauge.

The calorimeter tests were made with as much regularity as possible. Those for the second day showed the least superheating, because on that day the water was carried higher than previously, and it is believed that some water was drawn up into the superheater through the small pipes shown on the drawing leading downward from the elbows of the dry pipes. The water in the glass remained absolutely steady all the time, there being no violent ebullition at the water level in that part of the boiler with which the glass is connected. The feed-pump required very little regulating to maintain the water at a constant level. There was no spasmodic lifting of water in the boiler that did not remedy itself. Indeed none can be evident to any of the senses on account of the construction of the boiler and the course the circulating water takes. Whatever water the tubes discharge has a considerable distance to travel horizontally, and the action of gravity brings it all to the bottom of the shell before it can reach the dry pipe. Two and a half inches of water column was sometimes indicated by the gauges, and no peculiarity of action observed. It was not possible to maintain the pressure constant in the boiler with the stop-valve closed for any length of time, but the sudden opening or closing of it gave no indications of effects produced thereby.

Early in the trials of this boiler it became evident that its casing was illy adapted to the requirements of a forced draft. Heated gases escaped from some portions of it up to the end. The temporary expedient of daubing the leaky places with fire-clay only partially remedied the evil. Some portions of the lining were defective, causing the iron covering to heat to redness at times.

In view of these and certain other recognized defects, Mr. Cowles has submitted to us a design of somewhat different proportions as to heating surface, in which larger tubes are to be used. This is shown on the accompanying drawing marked No. 9. The new design has only 96.9 per cent. of the heating surface of the one tested. As its tubes are larger, possibly the better circulation through them may make it equal in efficiency. Its weight as given is somewhat greater, being, for the empty boiler, 9.6 tons; for the contained water, 3.05 tons; total, 12.65 tons. It will be observed that drums of 17 inches diameter have been substituted for the lower manifolds of the present boiler, and that the upper ends of the furnace tubes are expanded into the shell. This arrangement insures thorough circulation through the furnace tubes. The upper drum has been lowered 7 inches, giving more space above the structure for the removal of tubes.

It is through the top that all tubes are to be taken out and put in, but yet, as designed, all its tubes can not be so replaced in the space allotted to it in the ship. We have called Mr. Cowles's attention to this defect, which he proposes to remedy.

Some of the details shown on this drawing do not meet with the approval of the Board, but as they are mere propositions, and evident to any professional eye, we do not enumerate them.

In common with all pipe boilers only the very best tubes made should be used in it. It was evident that the tubes which burst under our observation gave way at welds, which suggests the advantage of the seamless-drawn steel tubes now in the market. Considering the high indications of the pyrometers and the considerable amount of superheating of the steam, we can see no margins upon which to draw for any better results than these tests have produced. Omitting the record of the first and last hours of the two days of record, during which the results were not quite at the average, the evaporation was sufficient for the production of 624.3 I. H. P., which, with six boilers, would amount to 3745.8 I. H. P. We see no reason for expecting a higher performance. The six boilers proposed for the coast defense vessel can be conveniently placed in the allotted space, as shown on the accompanying drawing numbered 10, and so as to conform to the terms of the circular.

Repairs to this boiler in any part would not be especially difficult. No spares need be carried except for the furnace tubes. The removal of a dozen or twenty of the "regular" tubes would have no disadvantage at all commensurate with the annoyance of providing for the stowage of that number of spares. No especial appliances are used with the boiler, nor is any extraordinary skill or attention required in attendance upon it. It can be worked in battery, as has already been done, and there is no reason to suppose it will not work well "in connection with ordinary marine boilers."

When the boiler is taken apart for removal an examination of its interior will be made, and the Bureau will be informed of the results.

It would be unjust to omit from this report our appreciation of the absolute fairness and continued good temper of all persons who have been connected on the proprietor's side with this trial. Despite the many annoyances that have marked its progress, there has been no exhibition of irritability on the part of any one, nor the slightest indication of a purpose to deceive.

Very respectfully,

CHAS. H. LORING,
Chief Engineer, President of Board.
GEO. W. MAGEE,
Chief Engineer, Member.
GEO. W. ROCHE,
Chief Engineer, Member.
J. J. BARRY,
Passed Assistant Engineer, Member.

Engineer-in-Chief GEORGE W. MELVILLE, U. S. N.,
Chief of Bureau of Steam Engineering.

NAVY YARD, NEW YORK, *May* 17, 1890.

SIR: Since the report on the Cowles boiler was signed, Mr. Cowles has furnished the board with a drawing, forwarded herewith and numbered 11, showing the provision that must be made in the deck overhead, the water-tanks, and the forward bulkhead, to make it possible to replace eighteen "regular" tubes in the six boilers of his proposal. The Board is of the opinion that there is no necessity for such provision. All these tubes can be easily removed without it, and if not replaced the loss of heating surface will be too insignificant to be noticed.

Respectfully,

CHAS. H. LORING,
Chief Engineer, Senior Member.

GEO. W. MELVILLE,
Engineer-in-Chief, U. S. Navy, Bureau of Steam Engineering,
Navy Department, Washington, D. C.

FORM NO. 80-1, TABLE 1*a*.—*Log of evaporative test of the Cowles boiler on April* 28, 1890.

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer, in inches of mercury.	Pounds of fuel consumed.	Pounds of dry refuse.	Pounds of water fed to boilers.	Temperatures.				Air pressure in inches of water.	Revolutions of blowing-engines.
							Feed-water, t_1.	Steam by thermometer at boilers.	In uptake.	Atmosphere.		
							°F.	°F.	°F.	°F.		
1	8.19	160	30.15	*160 4,200	....	8,990.15	58	....	....	....	½	380
2	9.19	160	30.15	2,400	....	8,990.15	58	514	995	60	½	......
3	10.19	160	30.15	1,200	....	8,990.15	58	515	1,070	62	½	......
4	11.19	160	30.15	2,100	....	17,980.3	58	500	915	63	½	......
5	12.19	160	30.15	1,500	....	8,990.15	58	506	1,035	64	½	......
6	1.19	160	30.15	1,500	....	8,990.15	58	510	1,040	65	½	......
7	2.19	160	30.15	1,800	....	17,980.3	58	515	1,035	67	½	......
8	3.19	160	30.15	2,100	....	8,990.15	58	520	1,065	67	½	......
9	4.19	160	30.15	1,800	....	17,980.3	58	500	1,025	69	½	......
10	5.19	160	30.15	2,100	....	8,990.15	58	475	1,035	71	½	......
11	6.19	160	30.15	1,200	....	17,980.3	58	480	1,005	69	½	......
12	7.50	160	30.15	....	3,457	1,840.75	58	....	825	64	½	......
				22,060		136,620.0		503.5	1005.5	65.54		

* Wood.

FORM NO. 80-1, TABLE 1*b*.—*Log of evaporative test of the Cowles boiler on May* 8, 1890.

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer, in inches of mercury.	Pounds of fuel consumed.	Pounds of dry refuse.	Pounds of water fed to boilers.	Temperatures. Feed-water, t_1.	Temperatures. Steam by thermometer at boilers.	Temperatures. In uptake.	Temperatures. Atmosphere.	Air pressure in inches of water.	Revolutions of blowing-engines.
							°F.	°F.	°F.	°F.		
1	8.07	160	30.05	*160 3,600	....	8,990.15	58	....	880	60	2	380
2	9.07	160	30.05	2,100	....	8,990.15	58	430	875	66	2	......
3	10.07	160	30.05	1,500	....	8,990.15	58	....	865	67	2	......
4	11.07	160	30.05	2,100	....	17,980.3	58	390	925	68	2	......
5	12.07	160	30.05	1,800	....	8,990.15	58	380	925	68	2	......
6	1.07	160	30.05	1,800	....	17,980.3	58	385	925	68	2	......
7	2.07	160	30.65	2,400	....	8,990.15	58	420	975	70	2	......
8	3.07	160	30.05	2,100	....	8,990.15	58	434	1,025	70	2	......
9	4.07	160	30.05	2,100	....	17,980.3	58	445	925	70	2	......
10	5.07	160	30.05	1,800	....	8,990.15	58	390	940	71	2	......
11	6.07	160	30.05	2,100	....	17,980.3	58	394	925	69	2	......
12	6.45	160	30.05	....	2,870	8,990.15 360	58	....	......	......	......	......
				23,560		144,202.45		407.55	926	68		

* Wood.

FORM No. 80-2.—During the trial seventeen calorimetric tests were made, the quality of the steam being calculated by the formula

$$\left(Q=\frac{1}{l}\,\frac{W}{w}\,(h'-h)-(T-h')\right)$$

Q = quality of steam, dry saturated steam being unity.
W = weight of water originally in calorimeter.
w = weight of water added to W by condensed steam.
T = total heat of water, due to observed pressure of steam.
l = latent heat of steam at observed pressure.
h = total heat of water of initial temperature t in calorimeter.
h' = total heat of water of final temperature t' in calorimeter.

The observed data and computed results are given in the following tables, Nos. 3*a* and 3*b*, the various quantities having been taken from Peabody's tables.

NOTE.—The greater the weight of condensed steam (w), the smaller will be the percentage of error in the value of Q, other things being equal.

The importance or weight of an error in any one of the observed readings, the others being correct, increases in the following order:

$$P, W, t, t', w.$$

FORM NO. 80-3, TABLE 3*a*.—*Log of calorimetric tests of the steam from a Cowles boiler, made at navy-yard, New York, on the 28th of April*, 1890.

No. of test.	Time.		Average pressure of steam in lbs. absol. P.	Weights.					Temperatures.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Calorimeter. *b*.	W+*b*.	W.	W+*b*+*w*.	*w*.	*t'*.	*t*.		
1	9.00	9.25	174.81	72	407.2	335.2	427.7	20.5	128.0	56.0	1.0917	514
2	9.30	9.50	174.81	72	404.2	332.2	420.7	16.5	115.6	56.9	1.0797	515
3	10.30	10.45	174.81	72	405.0	333.0	420.2	15.2	112.7	56.2	1.1420	500
4	11.27	11.45	174.81	72	404.5	332.5	420.2	15.7	111.1	56.5	1.0446	506
5	1.15	1.30	174.81	72	406.5	334.5	422.1	15.6	111.0	56.5	1.0839	515
6	3.00	3.15	174.81	72	406.2	334.0	422.2	16.0	112.0	56.5	1.0483	520
7	4.25	4.40	174.81	72	406.0	334.0	421.7	15.7	110.8	56.1	1.0529	475
8	5.30	5.48	174.81	72	404.4	332.0	420.2	15.8	111.9	56.4	1.0572	480
Mean values of Q and temperature											1.07504	503.125

Percentage of moisture in the steam, 100 (1 — Q),—7.5.

FORM NO. 80-3, TABLE 3*b*.—*Log of calorimetric tests of the steam from a Cowles boiler, made at navy-yard, New York, on the 8th of May*, 1890.

No. of test.	Time.		Average pressure of steam in lbs. absol. P.	Weights.					Temperatures.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Calorimeter. *b*.	W+*b*.	W.	W+*b*+*w*.	*w*.	*t'*.	*t*.		
1	9.23	9.36	174.81	71.2	400.2	329.0	414.7	14.5	112.7	60.0	1.09308	430
2	10.20	10.32	174.81	71.2	400.3	329.1	415.2	14.9	118.1	60.9	1.04277	390
3	11.20	11.35	174.81	71.2	401.0	329.8	416.4	15.4	112.5	60.4	.99850	380
4	12.15	12.25	174.81	71.2	401.8	330.6	416.9	15.1	112.5	60.4	1.02770	385
5	1.30	1.40	174.81	71.2	401.2	330.0	417.1	15.9	115.1	60.6	1.05980	420
6	2.40	2.50	174.81	71.2	400.4	329.2	415.1	14.7	118.0	61.0	1.04445	434
7	3.40	3.50	174.81	71.2	400.0	328.8	414.9	14.9	113.1	61.0	1.03880	445
8	4.40	4.50	174.81	71.2	400.1	328.9	415.5	15.4	113.6	60.8	1.01377	390
9	5.40	5.49	174.81	71.2	400.0	328.8	416.1	16.1	116.2	60.7	1.02370	394
Mean values of Q and temperature											1.038063	407.55

Percentage of moisture in the steam, 100 (1—Q), —3.8.

FORM No. 80-4.—From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, P	174.81
Average temperature of the feed water, t_1	58°
(a) Number of pounds of water vaporized, $W_1 \times Q$	280,822.4
(b) Number of pounds of water carried over with the steam, W_1 (1—Q)	0°
Total heat of steam at pressure P	1,194.962
Total heat of water at temperature t_1	26.12
(c) Units of heat required to vaporize one pound of water from a temperature t_1, and under a pressure P	1,168.962
(c_1) Units of heat required to raise the temperature of one pound of water from t_1 to the temperature due to the pressure P	316.785
(d) Units of heat required to vaporize one pound of water from and at a temperature of 212° and under atmospheric pressure	965.8
Total heat required to vaporize the water, $a \times c$	328,275,000
Total heat required to raise the steam from the temperature of saturation to actual temperature	18,209,252.1
(e) Total heat obtained from the fuel, as measured by the steam discharged	346,484,252.1
(f) Units of heat obtained per pound of fuel	7,595
(g) Units of heat obtained per pound of combustible	8,817.96
$\frac{f}{c}$ Potential evaporation per pound of fuel from a temperature t_1 and under a pressure P.	6.4972
$\frac{g}{c}$ Potential evaporation per pound of combustible from a temperature t_1 and under a pressure P	7.5434
$\frac{f}{d}$ Equivalent potential evaporation per pound of fuel from and at a temperature of 212° and under atmospheric pressure	7.8630
$\frac{g}{d}$ Equivalent potential evaporation per pound of combustible from and at a temperature of 212° and under atmospheric pressure	9.1302

FORM No. 80-5, TABLE 5.—*Recapitulation of the results of the evaporative and calorimetric tests of Cowles water tube boiler at navy-yard, New York, May* 8, 1890.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

TOTAL QUANTITIES.

Duration of test in hours	24.15
Fuel (George's Creek) consumed	45,620.
Refuse from fuel, in dry ashes, dust, and clinkers	6,327.
Combustible consumed	39,293.
Water fed to boiler by tank measurement, W_1	280,822.4
Per cent. of the fuel in dry refuse, etc	13.87

AVERAGE QUANTITIES.

Temperature of feed water, t_1	58°
Temperature of steam, by thermometer	458.053°
Temperature of uptake	965.909°
Temperature of atmosphere	66.682°
Temperature of fire-room	....
Barometer, in inches of mercury	30.10
Pressure of steam at boiler, in pounds, per square inch above a perfect vacuum, 14.7+press. by gauge in pounds, P	174.7
Pressure of steam at engine, in pounds, per square inch above a perfect vacuum	....
Air pressure, in inches of water	
Revolutions of blowing-engines, per minute	382

Rates of combustion.	Pounds of fuel.	Pounds of combustible.
Amount consumed per hour	1,889.026	1,627.039
Amount consumed per hour per square foot of grate surface	40.192	34.617
Amount consumed per hour per square foot of heating surface (exterior)	.93204	.80278

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature t_1 and under a pressure P	6.156	7.147
Equivalent apparent evaporation from and at 212° and under atmospheric pressure	7.450	8.650
Actual evaporation, into steam of quality Q, from a temperature t_1 and under a pressure P	6.156	7.147
Equivalent actual evaporation from and at 212° and under atmospheric pressure	7.450	8.650
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature t_1 and under a pressure P	6.49747	7.54344
Equivalent potential evaporation from and at 212° and under atmospheric pressure	7.86326	9.13015

APPENDIX H.

CONCLUSIONS OF THE BOARD.

NEW YORK, NAVY YARD, *May* 23, 1890.

SIR: The tests of all the coil boilers offered under advertisement of the honorable Secretary of the Navy having been completed, we respectfully submit the following as "the conclusions of the Board upon their relative merits" in the several respects enumerated in the order of the honorable Secretary convening the Board.

The evaporative efficiency is based upon the amount of water which, under the conditions of the tests, would be fed to all the boilers that the space allotted to the ship will contain, this quantity being multiplied by Q. This method disposes of the question of the Secretary's order, "the dryness of the steam." We find these values to be relatively 1.086 for the Ward, and 1.00 for the Cowles.

The relative weights are as the water used as above, divided by the weight of all the boilers respectively, as given in our reports. These values we find to be 1.186 for the Ward and 1.00 for the Cowles.

The weight of the contained water is so nearly similar in both boilers that we give no values to the difference.

In the matters of accessibility, ease of making repairs, and simplicity and interchangeability of parts we consider that the Ward boiler has a considerable advantage over its competitor. We think it scarcely necessary, however, to carry any spare parts with either boiler, except perhaps, a manifold or two; 10 or 15 per cent. of all the tubes may be removed without materially affecting the economy at natural draft, or even under a small fire-room pressure.

In ease of firing they are equal. For the care of the feed the Cowles has a great advantage over the Ward. We think one man could attend the feed of the six Cowles boilers as easily as he could two of the Ward, though fortunately the liability to damage from fluctuations of water level in the latter is small.

Both boilers will work well in battery, as both have done. In "durability and the capacity of long continued steaming, without cleaning," we think they are equal.

We desire, in this connection, to repeat the opinion expressed in our report on the Cowles boiler that only tubes of the very highest character should be used in such boilers, and the suggestion that those of seamless-drawn make would fill all the requirements. Even at the high price asked for these tubes at present, the cost of a boiler of either of the styles tested, if fitted with them, would be far less than that of a Scotch boiler of equal capacity. The only objection to their use is that, as yet, none are made in this country of steel.

Very respectfully,

CHAS. H. LORING,
Chief Engineer, President Board.
GEO. W. ROCHE,
Chief Engineer, U. S. Navy, Member.
GEO. W. MAGEE,
Chief Engineer, Member.
J. J. BARRY,
Passed Assistant Engineer, Member.

Chief Engineer GEORGE W. MELVILLE, U. S. Navy,
Chief Bureau of Steam Engineering.

APPENDIX J.

TESTS MADE AT THE NEW YORK NAVY YARD IN MAY, 1890, OF MANGANESE BRONZE, THE TEST SPECIMEN BEING CUT FROM THE POURING GATE FOR THE HUB OF THE PROPELLER FOR THE UNITED STATES STEAMER MAINE.

TRANSVERSE TESTS.

These tests were made by placing the specimens on supports on the bed of the testing machine and applying the load at the center. For nearly the whole range of loads the supports were ten inches apart, but when near the breaking point higher supports were used and placed nine inches apart, on account of the bending of the specimens. The first specimen, marked A, had the loads applied as shown in the table, the deflection in each case being measured after the load had remained on for two minutes; the load was then removed and the deflection again measured to discover the amount of "permanent set." This operation was repeated for each load up to 3,750 pounds, after which no measurements for permanent set were made.

Specimen B was tested in the same way, but with larger increments for the successive loads, as shown by the table. The maximum fiber strain was found from the usual formula for beams supported at the ends and loaded in the center,

$$mWl=nfbh$$

Where $m=\frac{1}{4}$ and $n=\frac{1}{6}$, l being taken as 9 inches.

SPECIMEN A.

[Placed in position specimen measured 10.562 inches. Section, 1.009 by 1.013 inches.]

Load.				
Total.	Specimen measured.		Specimen deflected.	
	On.	Off.	On.	Off.
	Inches.	*Inches.*	*Inches.*	*Inches.*
500	10.527	10.562	0.035	None.
700	10.520	10.562	0.042	None.
800	10.517	10.562	0.045	None.
900	10.509	10.562	0.053	None.
1,000	10.507	10.555	0.055	*0.007
1,300	10.484	10.545	0.078	0.017
1,400	10.480	10.540	0.082	0.022
1,600	10.460	10.532	0.102	0.030
1,800	10.437	10.517	9.125	0.045
2,000	10.378	10.485	0.184	0.077
2,200	10.358	10.478	0.204	0.084
2,500	10.256	10.382	0.306	0.180
2,750	10.140	10.290	0.422	0.272
3,000	9.810	9.995	0.752	0.567
3,500	9.286	9.485	1.276	1.077
3,750	8.689	....	1.873	(†)
6,300	8.540	Broke.	2.022	

SPECIMEN B.

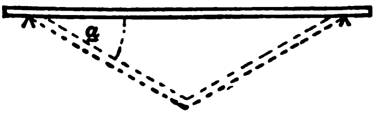
[Placed in position specimen measured 10.562 inches. Section, 1.007 by 1.0115 inches.]

1,150	10.507	10.556	0.055	0.006
2,000	10.404	10.523	0.158	0.029
2,500	10.247	10.400	0.315	0.162
3,000	9.918	10.083	0.644	0.479
3,500	9.598	....	0.964	(†)
6,450	8.079	Broke.	2.483	

* Permanent set.
† Nine inches between supports,

Specimen.	Applied load.		Deflection in inches.	Specific gravity.	Hardness.	Bent before rupture.*	Remarks.
	Total.	Maximum fiber strain.					
A	6,300	82,150	2.022	8.24	1.52173	24° 07′	Hardness is compared with composition: 88-10-2.
B	6,450	84,530	2.483	8.18	1.6279	28° 48′ 30″	

*Bent before rupture is the angle *a* between the normal position of the specimen and one side before it was ruptured, thus:



CRUSHING TESTS.

These test pieces were cut from the specimens which had already been subjected to transverse stress and broken, and the results are undoubtedly lower than would have been shown by metal which has not been previously strained.

The specimens were 1 inch high and 0.7 by 0.7 inches in cross section, or 0.4 square inches.

Both specimens gave way by shearing on a plane, making an angle of nearly 45° with the direction of the stress.

	Applied load.	Crushing strength per square inch.
A	61, 950	126, 450
B	66, 500	135, 750

A subsequent test on a specimen 1 inch high and 1 by 1 inch in cross section was made from a piece of the same "pouring gate," but which had not been previously strained. Under a stress of 150,000 pounds it was flattened to 0.72 inch high and 1¼ by 1¼ inches, but without rupture or any sign of distress, borings showing the interior to be homogeneous and without flaws.

TORSIONAL TESTS.

(One specimen of rolled and the other of cast metal.)

The test pieces were put in the centers of a heavy lathe, with a lever keyed to each end. A 48 inch lever was at the tail-stock end, and an 8-inch lever at the face-plate end, a lug on the face-plate holding the lever end and the specimen in position.

A bar was bolted to the carriage of the lathe at about the center of the long lever. A sliding piece, with a knife edge and working freely in a slot in the lever, was brought up to the bottom of the lever while this was in a horizontal position and with the knife edge just touching it. This arrangement enabled the observer to see that the lever was kept floating in a horizontal position for the required time, by sighting between the knife edge and the lever. With the lever horizontal, a zero mark was made on the periphery of the face-plate on the side opposite to which the weight was applied. The diameter of face-plate was 46.26 inches.

Before commencing the tests 2.92 pounds were added to the scale-pan, in order to bring the weight on end of lever up to 10 pounds.

A weight was then added, the lathe turned slowly by hand by means of the back gear, just enough to keep the lever horizontal and a mark then made on the periphery of the face-plate. At the end of two minutes the load was removed and another mark made. This was repeated for each increment of weight.

When the moment of torsion in the rolled piece was 3120 ($f=37717$) and in the cast piece, 3360 ($f=20797$), the lever in each case supported the weight a short time only and then slowly settled on the knife edge. The same thing occurred for each subsequent moment until the breaking stress was reached.

The elastic limit was not clearly defined but it was thought to be for the rolled piece between the moments of torsion 1440 and 1680 ($f=17408$ and 20309.4) and for the cast piece, between 1920 and 2400 ($f=11884$ and 14855).

Rolled specimen.

Diameter of ends .... inches .. 1 1/4
Diameter of smallest part .... do 3/4
Length of smallest part .... do 4
Length of lever between centre and point of application of load .... do 48
Moment of lever alone, in inch-pounds 340.125
Breaking stress, in pounds per square inch .... 66,730.

Number.	Equivalent weight on end of lever.	Distance of mark on face-plate from zero.		Torsion angle from zero.		Twist of piece measured on a circle of 12-inch radius.	Moment of torsion in inch-pounds.	Value of f from $M = \frac{fd^3}{5.1}$ $f = \frac{48 \times W \times 5.1}{.75^3}$	Angle of recovery.
		Load on.	Load removed.	Load on.	Load removed.				
				°	°				°
0	10	0	0	0	0	0	480	5802.0	0
1	15	3/16	0	.46	0	.097162	720	8704.0	.46
2	20	3/8	0	.93	0	.194325	960	11605.0	.93
3	25	17/32	3/32	1.31	.23	.275293	1200	14506.7	1.08
4	30	3/4	3/32	1.85	.23	.388650	1440	17408.0	1.62
5	35	15/16	5/32	2.32	.39	.485812	1680	20309.4	1.93
6	40	1 3/16	1/4	2.93	.62	.615362	1920	23211.0	2.31
7	45	1 7/16	5/16	3.56	.77	.744912	2160	26112.0	2.79
8	50	1 25/32	15/32	4.41	1.16	.923043	2400	29013.0	3.25
9	55	2 1/8	5/8	5.26	1.55	1.101175	2640	31914.0	3.71
10	60	2 9/16	15/16	6.34	2.32	1.327887	2880	34815.0	4.02
11	65	3 1/4	1 7/16	8.04	3.56	1.684150	3120	37717.0	4.48
12	70	4 11/32	2 3/8	10.74	5.87	2.250931	3360	40619.0	4.87
13	75	6 3/16	4 1/16	15.30	10.05	3.206362	3600	43520.0	5.25
14	80	9 1/32	6 11/16	22.34	16.50	4.679993	3840	46421.0	5.84
15	85	13 1/8	10 9/16	32.46	26.12	5.246775	4080	49323.0	6.34
16	90	17 31/32	15 1/4	44.44	37.72	9.311406	4320	52224.0	6.72
17	95	23 5/8	20 23/32	58.43	51.24	12.242475	4560	55125.0	7.19
18	100	30 1/8	27 11/32	75.43	67.63	15.805100	4800	58027.0	7.80
19	105	38 5/8	35 11/32	95.53	87.41	20.015475	5040	60928.0	8.12
20	110	54 3/4	51	135.41	126.13	28.371450	5280	63829.0	9.28
21	115	139	Broke	343.77	Broke	72.029800	5520	66730.0	......

Cast specimen.

Diameter of ends .... inches .. 1 1/4
Diameter of smallest part .... do 15/16
Length of smallest part .... do 4
Length of lever between centre and point of application of load .... do 48
Moment of lever alone, in inch-pounds 340.125
Breaking stress, in pounds per square inch 53,478

Number.	Equivalent weight on end of lever.	Distance of mark on face-plate from zero.		Torsion angle from zero.		Twist of piece, measured on circle of 12-inch radius.	Moment of torsion, inch-pounds.	Value of f from $M = \frac{fd^3}{5.1}$. $f = \frac{48 \times W \times 5.1}{.9375^3}$.	Angle of recovery in degrees.
		Load on.	Load removed.	Load on.	Load removed.				
				°	°				°
0	10	0	0	0.	0.	0.	480	2971	0.
1	20	3/16	0	.46	0.	.096	960	5942	.46
2	30	11/32	0	.85	0.	.178	1440	8913	.85
3	40	9/16	0	1.39	0.	.291	1920	11884	1.39
4	50	29/32	7/32	2.24	.54	.469	2400	14855	1.7
5	60	1 7/16	15/32	3.56	1.31	.746	2880	17826	2.25
6	70	2 5/8	1 3/4	7.11	4.33	1.489	3360	20797	2.78
7	80	5 3/8	4 5/16	13.91	10.67	2.911	3840	23768	3.24
8	90	9 9/16	8 1/16	23.65	19.94	4.953	4320	26739	3.71
9	100	14 5/8	13	36.17	32.15	7.575	4800	29710	4.02
10	110	20 1/2	18 1/4	50.08	45.13	10.489	5280	32681	4.95
11	120	26 13/16	24 5/8	66.31	60.9	13.889	5760	35652	5.41
12	130	34 1/8	31 7/16	84.39	78.06	17.675	6240	38623	6.33
13	140	42 1/16	39 7/16	104.02	97.22	21.786	6720	41594	6.08
14	150	50 11/16	47 3/4	125.35	118.09	26.253	7200	44565	7.26
15	160	61 1/8	58	151.16	143.43	31.639	7680	47536	7.73
16	170	72 1/8	69 5/16	179.29	171.1	37.540	8160	50507	8.19
17	180	77 9/16	Broke.	191.81	Broke.	40.179	8640	53478	.....

APPENDIX K.

Experiments made at the New York navy-yard by engineer officers of the Navy to determine the best form of steam jets for launch boilers, under the following instructions of the Bureau of Steam Engineering, dated July 21, 1890:

"Tests will be made with each of the jets shown on plate No. 12 and numbered 1 to 5. Two boilers will be used; one, on which the jet is used, to be of the square type with inclined tubes designed by the Bureau and built at the New York navy-yard; the other, supplying the steam for the jet, being any small launch boiler that may be convenient.

"Each test will continue for four hours. The fire in the boiler using the jet will be in good condition at the beginning, and in the same condition at the end of each test. At the end of a test, the fire will be allowed to die out and the ash weighed dry. The amount of coal burned in the boiler using the jet during the four hours will be carefully ascertained. The weight of coal used in the supply boiler need not be noted. The height of water in both boilers will be the same at the beginning and end of each test. The water will be measured from the experimental feed tanks.

"The data will be carefully taken every fifteen minutes and recorded on the accompanying forms."

Results of experiment of August 11, 1890, with jet No. 1.

Boiler using jet. (Square boiler, inclined tubes; Bureau design.)							Boiler supplying steam to jet. (Navy-launch boiler, type 6x6.)	
Time.	Velocity per minute of air entering ash-pit.	Steam-pressure.	Pounds of water evaporated.	Temperatures.		Per cent. of moisture in steam.	Steam pressure.	Pounds of water evaporated.
				Feed-water.	Air.			
9.34	370	80	....	81	84		80	....
.49	350	80	120	81	85		80	25
10.04	320	80	110	81	86		80	25
.19	270	80	130	83	87	1.8	80	25
.34	270	80	120	83	88		80	20
.49	280	80	110	83	89		80	25
11.04	290	80	120	77	89		80	25
.19	290	80	120	78	89	22.5	80	25
.34	300	80	100	78	89		80	25
.49	310	80	120	78	89		80	25
12.04	320	80	120	78	89		80	20
.19	310	80	110	78	89	7.2	80	25
.34	320	80	120	78	88		80	25
.49	330	80	130	78	88		80	25
1.04	300	80	110	78	88		80	25
.19	280	80	100	78	88	9.8	80	25
.34	350	80	115	78	88		80	25

SUMMARY.

Mean steam pressure	80
Mean temperature of feed water	79.4
Pounds of coal burned in four hours	311
Pounds of refuse	76.5
Pounds of combustible	234.5
Per cent. of ashes	24.6
Square feet of grate in boiler using jet	3.2
Pounds of coal burned per square foot of grate-surface per hour	24.3
Pounds of water evaporated per hour in boiler using jet (*a*)	463.8
Pounds of water evaporated per hour in boiler supplying jet (*b*)	97.5

$$\frac{b \times 100}{a} = \frac{97.5 \times 100}{463.8} = 21.2 \text{ per cent.}$$

Results of experiment of August 12, 1890, *with jet No.* 2.

Boiler using jet. (Square boiler, inclined tubes. Bureau design.)							Boiler supplying steam to jet. (Navy-launch boiler; type 6 x 6.)	
Time.	Velocity per minute of air entering ash-pit.	Steam pressure.	Pounds of water evaporated.	Temperatures.		Per cent. of moisture in steam.	Steam pressure.	Pounds of water evaporated.
				Feed-water.	Air.			
10.21	500	80	....	81	87		80	....
.36	380	80	150	82	88		80	30
.51	400	80	140	84	89		80	30
11.06	410	80	160	80	89	3.9	80	25
.21	430	80	140	81	89		80	35
.36	420	80	150	79	90		80	30
.51	450	80	130	79	91		80	30
12.06	480	80	150	81	91	12.4	80	30
.21	520	80	140	79	92		80	25
.36	480	80	150	80	93		80	30
.51	500	80	140	79	93		80	30
1.06	430	80	150	78	92	7.2	80	30
.21	390	80	130	79	92		80	35
.36	380	80	140	78	91		80	30
.51	410	80	160	79	92		80	30
2.06	400	80	140	78	93	17.1	80	30
.21	480	80	150	79	93		80	30

SUMMARY.

Mean steam pressure	80
Mean temperature of feed-water	79.8
Pounds of coal burned in four hours	450
Pounds of refuse	104.8
Pounds of combustible	345.2
Per cent. of ashes	23.3
Square feet of grate in boiler using jet	3.2
Pounds of coal burned per square foot of grate-surface per hour	35.2
Pounds of water evaporated per hour in boiler using jet (*a*)	580
Pounds of water evaporated per hour in boiler supplying jet (*b*)	120

$$\frac{b \times 100}{a} = \frac{120 \times 100}{580} = 20.7 \text{ per cent.}$$

Results of experiment of August 13, 1890, *with jet No.* 3.

Boiler using jet. (Square boiler, inclined tubes. Bureau design.)							Boiler supplying steam to jet. (Navy-launch boiler; type 6 x 6.)	
Time.	Velocity per minute of air entering ash-pit.	Steam pressure.	Pounds of water evaporated.	Temperatures.		Per cent. of moisture in steam.	Steam pressure.	Pounds of water evaporated.
				Feed-water.	Air.			
10.05	230	80	....	82	84		80	....
.20	180	80	100	82	84		80	10
.35	170	80	80	83	84		80	5
.50	180	80	100	84	84	17.2	80	10
11.05	170	80	90	85	85		80	5
.20	190	80	90	82	85		80	5
.35	210	80	100	83	86		80	10
.50	170	80	80	83	87	21.6	80	5
12.05	180	80	90	77	88		80	10
.20	190	80	80	78	88		80	10
.35	180	80	100	79	88		80	5
.50	190	80	80	80	88	6.2	80	10
1.05	200	80	90	80	87		80	5
.20	190	80	90	78	87		80	10
.35	180	80	90	79	86		80	5
.50	170	80	100	80	86	7.1	80	10
2.05	170	80	85	79	87		80	5

SUMMARY.

Mean steam pressure	80
Mean temperature of feed-water	80.8
Pounds of coal burned in four hours	182
Pounds of refuse	45.5
Pounds of combustible	136.5
Per cent. of ashes	25
Square feet of grate in boiler using jet	3.2
Pounds of coal burned per square foot of grate-surface per hour	14.2
Pounds of water evaporated per hour in boiler using jet (*a*)	361.25
Pounds of water evaporated per hour in boiler supplying jet (*b*)	30

$$\frac{b \times 100}{a} = \frac{30 \times 100}{361.25} = 8.3 \text{ per cent.}$$

Results of experiment of August 14, 1890, *with jet No.* 4.

Boiler using jet. (Square boiler, inclined tubes. Bureau design.)							Boiler supplying steam to jet. (Navy-launch boiler; type 6 x 6.)	
Time.	Velocity per minute of air entering ash-pit.	Steam pressure.	Pounds of water evaporated.	Temperatures.		Per cent. of moisture in steam.	Steam pressure.	Pounds of water evaporated.
				Feed-water.	Air.			
9.47	470	80	....	83	85		80	....
10.02	470	80	140	83	86		80	10
.17	400	80	120	84	87		80	20
.32	330	80	130	81	88	14.4	80	15
.47	400	80	140	82	89		80	15
11.02	410	80	120	84	90		80	15
.17	390	80	150	78	91		80	20
.32	400	80	130	79	92	4.6	80	15
.47	440	80	130	78	93		80	15
12.02	400	80	140	79	94		80	15
.17	350	80	120	81	95		80	10
.32	430	80	140	79	95	.7	80	20
.47	450	80	120	81	96		80	15
1.02	480	80	150	82	95		80	15
.17	380	80	120	78	94		80	20
.32	430	80	140	79	94	3.3	80	15
.47	440	80	134	80	95		80	18

SUMMARY.

Mean steam pressure	80
Mean temperature of feed-water	81.1
Pounds of coal burned in four hours	344.5
Pounds of refuse	82.7
Pounds of combustible	261.8
Per cent. of ashes	24
Square feet of grate in boiler using jet	3.2
Pounds of coal burned per square foot of grate-surface per hour	26.9
Pounds of water evaporated per hour in boiler using jet (*a*)	528.5
Pounds of water evaporated per hour in boiler supplying jet (*b*)	63.2

$$\frac{b \times 100}{a} = \frac{63.25 \times 100}{528.5} = 12 \text{ per cent.}$$

Results of experiment of August 15, 1890, *with jet No.* 5.

Boiler using jet. (Square boiler, inclined tubes. Bureau design.)							Boiler supplying steam to jet. (Navy launch boiler; type 6x6.)	
Time.	Velocity per minute of air entering ash-pit.	Steam pressure.	Pounds of water evaporated.	Temperatures.		Per cent. of moisture in steam.	Steam pressure.	Pounds of water evaporated.
				Feed-water.	Air.			
9.21	470	80	....	84	81		80	....
9.36	500	80	140	84	83		80	20
.51	530	80	130	85	85		80	15
10.06	500	80	150	81	87	12.2	80	20
.21	490	80	130	83	89		80	15
.36	450	80	140	85	91		80	25
.51	460	80	130	79	93		80	20
11.06	430	80	140	81	95	1	80	15
.21	440	80	130	79	96		80	20
.36	450	80	150	81	97		80	25
.51	470	80	120	83	98		80	20
12.06	440	80	140	80	99	13.1	80	15
.21	420	80	130	80	100		80	20
.36	430	80	140	79	99		80	20
.51	390	80	130	80	99		80	15
1.06	410	80	140	81	98	.9	80	20
.21	440	80	140	79	98		80	20

SUMMARY.

Mean steam pressure	80
Mean temperature of feed-water	81.4
Pounds of coal burned in four hours	354
Pounds of refuse	84.4
Pounds of combustible	269.6
Per cent. of ashes	23.8
Square feet of grate in boiler using jet	3.2
Pounds of coal burned per square foot of grate-surface per hour	27.7
Pounds of water evaporated per hour in boiler using jet (*a*)	545
Pounds of water evaporated per hour in boiler supplying jet (*b*)	76.25

$$\frac{b \times 100}{a} = \frac{76.25 \times 100}{545} = 14 \text{ per cent.}$$

REPORT

OF

THE PAYMASTER-GENERAL OF THE NAVY.

NAVY DEPARTMENT,
BUREAU OF PROVISIONS AND CLOTHING,
October 15, 1890.

SIR: I have the honor to submit the annual report of the Paymaster-General of the Navy for the fiscal year ending June 30, 1890, with estimates of appropriations required for the fiscal year ending June 30, 1892, and tabulated statements, as follows:

(A) General financial statement.
(B) Comparative statement of expenditures by appropriations during fiscal years 1889 and 1890.
(C) Statement of expenditures of labor and material at shore stations, and objects to which applied.
(D) Statement of appropriation Provisions Navy, 1890.
(E) Statement of appropriation Contingent, P. & C., 1890.
(F) Statement of appropriation Clothing fund.
(G) Statement of appropriation Small-stores fund.
(H) Classified abstract of property returns from navy-yards and stations.
(I) Condensed abstract of property returns from navy-yards and stations.
(J) Statement of value of stores on board ships.
(K) Statement of auction sales under Bureau of Provisions and Clothing.
(L) Summary of open purchase requisitions and Bureau orders acted upon.
(M) Compilation of the cost of maintaining all naval vessels in commission.
(N) Schedule of proposals received.

The total credits under appropriations carried on the books of this Bureau during the fiscal year ending June 30, 1890, amounted to $30,213,307.14. The amount drawn through the Bureau during the year on requisitions was $11,882,269.71. The total debits, as shown in Appendix A, including settlements by the Fourth Auditor of the Treasury, amounted to $13,444,041.05, leaving a balance to the credit of the appropriations on the 30th of June, 1890, of $16,769,266.09. Against this balance are outstanding obligations amounting, approximately, to $13,514,000 (Appendix B), the remaining three and a quarter millions being made up of continuous appropriations and small final balances under annual appropriations, which, at the proper time, will be covered into the Treasury.

The appropriations above referred to do not include "Pay of the Navy," "Pay miscellaneous," "Contingent Navy," "Pay Naval Academy," or the appropriations for the support of the Marine Corps, or the various appropriations by Congress for bounty, "Relief of sufferers at Samoa," or for claims, none of which are carried on the books of this Bureau, but all of which should be so carried in order to enable the Bureau to present a complete report of the expenditures for the Navy.

These appropriations aggregate about $9,000,000.

If this sum should be added to the total expenditures, as shown by the books of this Bureau (Appendix B), the result (about $22,500,000) would be the approximate cost of maintaining the Navy during the last fiscal year. In this sum is included about $6,500,000 expended for "Increase of the Navy."

The amount expended during the year at shore stations for supplies, as shown in Appendix A, was $3,223,622.80; for labor, $4,179,472.21; for construction and repair of ships, maintenance of yards, dry-docks, yard buildings, machinery plant, etc., $4,512,138.35, making a total expenditure of $11,915,233.36. The difference between this amount and that drawn from the Treasury, as stated above, is owing to the balances remaining in the hands of pay officers at the beginning of the fiscal year.

The amounts expended for construction and for repair upon vessels of the Navy in money and material during the last fiscal year, are shown in detailed form in Appendix C, and aggregate $5,451,204.06. In this appendix is also shown in detail the amounts expended at each naval station during the year for all objects other than supplies, aggregating $5,478,951.80.

The cost of commission of each ship in the Navy during the past year, exclusive of medicine, is shown in Appendix M, the total amounting to $5,943,752.42.

The supplies remaining on hand on the 30th day of June at shore stations (exclusive of clothing and small stores, valued at $487,204.19) (Appendix I, recapitulation) aggregated in value $16,819,884.31.

Under the provisions of the act of June 30, 1890, these supplies are now being arranged, consolidated, catalogued, and issued as supplies belonging to the Navy rather than to any particular bureau, and no new supplies are being purchased for any department which can be furnished from this consolidated stock.

The tabulated statements hereto annexed indicate the character of the work performed in the Bureau and the progress which is being made under the system of book-keeping recently inaugurated.

When it is considered that all supplies for the Navy are purchased through this Bureau, that all accounts in connection with them are kept by it, and that all payments for them are made under its direction, it is apparent that the title Bureau of "Provisions and Clothing" is misleading and should be changed to that of Bureau of "Supplies and Disbursements," as recommended by you in your last annual report. Much of the work that was formerly distributed through the several bureaus is now concentrated in this Bureau, and the clerical force at present allowed is found to be entirely inadequate to a proper and satisfactory discharge of the duties devolving upon it. Notwithstanding the fact that a great deal of work is done at night, much that ought to be accomplished has to remain undone, simply for want of sufficient force to do the work. Twelve additional clerks would not be too many; I have estimated for seven, and earnestly request that you will urge Congress to make the necessary appropriation.

The duties devolving on the chief clerk of this Bureau are of an important and laborious character, requiring business capacity and experience and great executive ability. For this reason, and in view of the fact that in the absence of the Paymaster-General, he becomes, under the law, acting chief of the Bureau, he certainly should receive a higher rate of pay than that of a fourth-class clerk, as at present. I have estimated for an increase of $700, and respectfully request that you will recommend to Congress to make the pay of the chief clerk of this Bureau $2,500 per annum.

Under the present system of purchases this Bureau is charged with the preparation, practically, of all advertisements, prorating the expenses of the same, assigning to each bureau its legitimate share, and the preparation of vouchers for payment under their respective appropriations. It is obvious, therefore, that if one appropriation could be made, covering all advertising for the Navy, the volume of papers and necessary labor in handling these accounts would be reduced and payments greatly facilitated. In consideration of these facts, I respectfully recommend that Congress be asked to make a single appropriation to cover all advertising for the Navy.

I feel it my duty to renew the recommendations made in the last annual report of the Paymaster-General in regard to an increase in the pay corps. During the coming year the corps will be reduced to the limit fixed by the act of August 5, 1882.

There are at present but four pay officers "waiting orders;" within the next few months ten will be required for ships that will be placed in commission. Assistant paymasters are now needed for ships and as assistants to general storekeepers, and if available would be so employed. It is therefore recommended that the grade of assistant paymaster be increased to its original number, namely, twenty, and that hereafter all appointments to the pay corps be made from the graduates of the Naval Academy.

I have the honor to be, very respectfully, your obedient servant,

EDWIN STEWART,
Paymaster-General, U. S. Navy.

Hon. B. F. TRACY,
Secretary of the Navy.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the Bureau of Provisions and Clothing, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
SALARIES.			
One chief clerk * (increase $700, submitted)	$2,500.00		
Two clerks class four (act July 11, 1890)	3,600.00		
Four clerks class three (same act)	6,400.00		
Three clerks class two (same act)	4,200.00		
Two stenographers class two (same act)	2,800.00		
Eleven clerks class one (same act)	13,200.00		
Two clerks class $1000 (same act)	2,000.00		
Two copyists class $900 (same act)	1,800.00		
One messenger class $720 (same act)	720.00		
Two laborers class $660 (same act)	1,320.00		
One clerk class four (submitted)	1,800.00		
One clerk class three (submitted)	1,600.00		
One clerk class two (submitted)	1,400.00		
Three clerks class one (submitted)	3,600.00		
One clerk class $1,000 (submitted)	1,000.00		
		$47,940.00	$37,840.00

* The position of chief clerk of the Bureau of Provisions and Clothing is one of very great importance, and, in my judgment, the compensation is totally inadequate.

The Bureau has charge of the purchases, under my direction, of all Navy supplies, and is called upon through the Paymaster-General, and in his absence by the chief clerk as acting chief of the Bureau, to approve vouchers aggregating thirteen thousand annually, involving nearly $13,000,000.

It is the accounting division of the United States Navy and requires for its chief clerk not only a man of executive capacity and business ability, but also a thorough accountant, as under the law he is in charge of the work, under the supervision of the chief of the Bureau, and must be able by education and experience to direct and control the countless details to which it is impossible for the Paymaster-General to give his attention.

The whole system of purchases, including forms of bookkeeping, preparation of vouchers, etc., will require some radical improvements, and, therefore, close and continuing work.—B. F. TRACY, *Secretary of the Navy.*

Estimates of appropriations required for the service of the fiscal year, etc.—**Continued.**

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891
PROVISIONS.			
For provisions and commuted rations for the seamen and marines (R. S., p. 733, secs. 3709, 3747), commuted rations for naval cadets and officers on sea duty (act May 12, 1879, Vol. 21, p. 3, sec. 1), and commuted rations stopped and credited to the "hospital fund" on account of sick in hospitals (act June 30, 1890)	*$1,025,000.00		
Fresh water for drinking and cooking purposes on board ship (act June 30, 1890)	10,000.00		
Labor in general store houses and paymaster's offices in navy-yards (act June 30, 1890) not to exceed	100,000.00		
		$1, 135, 000. 00	$1, 066, 000. 0
CIVIL ESTABLISHMENT.			
(Act January 30, 1885, vol. 23, p. 295, sec. 3; act June 30, 1890.)			
Navy-yard, Portsmouth, N. H.: In general store-houses: Two book-keepers, at $1.200 per annum each; one assistant book-keeper, at $720; one bill clerk, at $1,000; one assistant clerk, at $720; one shipping and receiving clerk, at $1,000. Navy-yard, Boston, Mass.: In general store-houses; One book-keeper, at $1,017.25; one shipping clerk, at $1,000; one receiving clerk, at $1,000. In pay office: One writer, at $1,017.25. Navy-yard, Brooklyn, N. Y.: One writer to boards of inspection, $900. In general store-houses: Three book-keepers, at $1,200 per annum each; one assistant book-keeper, at $1,000; one assistant book-keeper, at $720; three receiving clerks, at $4 per diem each; one assistant receiving clerk at $1,000; three shipping clerks, at $1, 000 per annum each; one bill clerk, at $1,000; one assistant bill clerk, at $720; two leading men, at $2.50 per diem each; five pressmen, at $2.76 per diem each; one superintendent of coffee mills, at $3.00 per diem; one box-maker, at $3.00 per diem; one engine tender, at $3.26 per diem; one coffee roaster, at $2.50 per diem; one fireman, at $2.00 per diem; one messenger, at $2.25 per diem. In pay office: One writer. at $1,017.25; one messenger at $2.25 per diem. Navy-yard, League Island, Pa.: In general store-house: One book-keeper, at $1,200; one assistant book-keeper, at $720. Navy-yard, Washington, D. C.: In general store-house: One book-keeper, at $1.200; one clerk, at $1,200; one receiving clerk, at $1,000; one bill clerk, at $1,000; one shipping clerk, at $1,000. In pay office: One writer, at $1.017.25. Naval Academy, Annapolis, Md.: In general store-house: One book-keeper, at $1,017.25; one receiving and shipping clerk, at $1,000. Torpedo-Station, Newport, R. I.: In general store-house: One clerk, at $1,200. Navy-yard, Mare Island, Cal.: In general store-houses: Two book-keepers, at $1,200 per annum each; two assistant book-keepers, at $720 per annum each; one receiving clerk, at $1,000; one shipping clerk, at $1,000; one bill clerk, at $1,000; one assistant clerk, at $1,000. In pay office: One writer, at $1,017.25. Navy-yard, Norfolk, Va: In general store-houses: Two book-keepers, at $1,200 per annum each; two assistant book-keepers, at $1,017.25 per annum each; one bill clerk, at $1,000; one assistant bill clerk, at $720; one receiving clerk, at $942; one assistant receiving clerk, at $720. In pay office: One writer, at $1.017.25; in all, $67,532.03; and no other fund appropriated by this act shall be used in payment for such service.	67, 532. 03	67, 532. 03	67, 532. 0

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* This increased estimate for provisions is based upon an average of actual expenditures for the pas three years; the increase being about equal to the amounts appropriated to cover deficiencies.

Estimates of appropriations required for the service of the fiscal year, etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
CONTINGENT.			
For freight and express charges, postage, telegrams, telephones, tolls, ferriage, car-fare, candles for the naval service ashore and afloat, fuel, books, blanks, Bureau and other stationery, printing, newspapers (advertising*), office furniture and fixtures for the Bureau, general storehouses and yard paymaster's offices, expenses of naval clothing factory and machinery for same, yeomans' stores, iron safes, ice, boxes, and other material for preserving, packing, and shipping Provisions and Clothing stores, and all other necessary and incidental expenses impossible to foresee and classify (act June 30, 1890)	$40,000.00	$40,000.00	$40,000.00

* May be omitted, if the Bureau's recommendation for an appropriation for advertising is approved.

APPENDIX A.

General financial statement.

OFFICE OF THE PAY-MASTER-GENERAL, U. S. NAVY, BUREAU OF PROVISIONS AND CLOTHING.

General account for the fiscal year, 1890, embracing all appropriations borne on the books of the Paymaster-General's office.

RECEIPTS.

Balance July 1, 1889		$24,561,291.94
Annual appropriations, 1890	$5,041,868.93	
Naval Home, Philadelphia, Pa	68,517.00	
Observations Eclipse of the Sun	5,000.00	
Deficiencies, act April 4, 1890	56,000.00	
		5,171,385.93
Deposits by Pay Officers and credits by Fourth Auditor:		
Clothing fund	185,683.84	
Small-stores fund	45,451.34	
Naval-hospital fund	67,522.49	
Construction and Repair	54,288.51	
Steam Machinery	14,671.87	
Miscellaneous	113,011.22	
		480,629.27
Total receipts		30,213,307.14

EXPENDITURES.

Drawn through the Bureau of Provisions and Clothing.	11,882,269.71	
Covered in the Treasury to the credit of surplus fund.	64,020.47	
Debited by the Fourth Auditor in settlement of accounts, Provisions	1,064,797.53	
Equipment of Vessels	140,220.90	
Steam Machinery	37,166.64	
Construction and Repair	10,422.15	
Miscellaneous	245,143.65	
		13,444,041.05
Balance, June 30, 1890		16,769,266.09

(NOTE.—The accounts borne upon the books of the Paymaster-General's office do not include the appropriations for Pay of the Navy, Pay Miscellaneous, Contingent Navy, for the support of the Marine Corps, Pay Naval Academy, or the various appropriations by Congress for Bounty, Relief of sufferers at Samoa, or Claims.)

Statement, by Bureaus, showing separately amounts drawn to pay Money Vouchers and Advances to Pay Officers at Stations, with number of money requisitions drawn and number of approved vouchers paid.

Pertaining to—	Requisitions drawn.	Vouchers paid.	Advanced to pay—	
			Money Vouchers.	Labor Rolls.
Yards and Docks	447	1,743	$1,013,195.88	$462,475.76
Equipment	343	1,850	441,825.03	227,395.95
Navigation	246	987	125,721.93	55,181.66
Ordnance	396	2,521	1,412,873.85	788,292.09
Construction and Repair	385	1,868	749,250.94	1,825,004.62
Steam Engineering	320	1,466	387,188.77	550,633.18
Provisions and Clothing	308	1,875	530,135.72	215,725.83
Medicine and Surgery	321	1,366	187,175.39	39,985.15
Navy Department	78	129	2,920,008.46	200.00
	2,844	18,305	7,717,875.47	4,164,894.24

Advanced to pay Money Vouchers	$7,717,375.47
Advanced to pay Labor Rolls, etc	4,164,804.24
Total	11,882,269.71

LABOR ROLL ACCOUNT.

Statement, by Naval Stations, showing amounts advanced to pay Labor Rolls, and amounts expended.

Naval Stations.	Advances.	Expended.
Navy Yard, Portsmouth	$257,439.57	$255,727.09
Navy Yard, Boston	157,888.86	196,643.15
Torpedo Station, Newport	36,090.61	37,351.12
Training Station, Newport	6,815.09	6,815.09
Naval Station, New London	7,251.02	7,004.29
Navy Yard, Brooklyn	1,419,861.81	1,442,006.50
Navy Yard, League Island	120,992.54	119,353.63
Naval Home, Philadelphia	18,880.98	18,361.22
Navy Agent, Baltimore	700.00	618.98
Naval Academy, Annapolis	75,631.72	74,801.63
Navy Yard, Washington	830,891.92	826,967.28
Navy Yard, Norfolk	542,147.61	543,999.05
Naval Station, Port Royal	1,760.87	1,760.37
Naval Station, Key West	6,267.78	6,181.02
Navy Yard, Pensacola	29,280.51	29,276.24
Navy Yard, Mare Island	628,060.90	612,607.43
Total	4,138,970.24	4,179,373.90

Advances to Navy Pay Officers to pay Labor Rolls and miscellaneous payments.

Advanced by Bureau to Pay Officers		$4,164,804.24
Advanced by Secretary's Office		1,523.14 81.00
Total advances		4,166,498.38
Less advanced to Navy Pay Officers	$27,284.14	
To meet payments made previous year	244.00	
		27,528.14
Advanced to pay Labor Rolls		4,138,970.24
Balances on hand July 1, 1889		147,799.19
Total receipts		4,286,769.43
Less—		
Deposits in Treasury	9,395.01	
Balances June 30, 1890	98,000.52	
		107,395.53
Advanced and expended		4,179,373.90
Omitted in Money Statement, League Island		18.00
Add Special Roll, Navy-yard, Washington, D. C		80.31
Payments for Labor		4,179,472.21

Money Voucher account.

Advanced to pay Money Vouchers		$7,717,375.47
Payments from fund on hand		9,842.43
Secretary's office, Fourth Auditor's Certificate		9,055.89
Total advances		7,736,273.79
Refunded by Pay Officers	$512.24	
Due on voucher, previous year	.40	
		512.64
Balance vouchers		7,735,761.15

Purchases under Title X, Supplies in Store, by Bureaus.

Yards and Docks	$214,445.27
Equipment and Recruiting	277,712.35
Navigation	67,951.88
Ordnance	1,192,327.85
Construction and Repair	685,008.54
Steam Engineering	258,740.68
Provisions and Clothing	518,658.84
Medicine and Surgery	8,777.39
	3,223,622.80

Statement of payments through the Paymaster-General's office on Contract, Open Purchase, and Open Contract Vouchers.

Bureau.	Contract.	Open purchase.	Open contract.	Total.
Yards and Docks	$890,627,56	$79,194.21	$43,015.99	$1,012,837.76
Equipment	279,993.88	130,437.93	35,150.36	445,582.17
Navigation	36,516.69	54,256.23	39,841.92	130,614.84
Ordnance	711,680.53	627,654.10	73,931.10	1,413,265.73
Construction and Repair	575,597.86	163,219.96	10,282.10	749,099.92
Steam Engineering	283,108.65	108,310.84	4,825.17	396,244.66
Provisions and Clothing	449,475.30	69,974.14	10,685.88	530,135.32
Medicine and Surgery	76,867.98	42,632.29	18,472.02	137,972.29
Secretary's Office	2,822,072.39	....	97,935.57	2,920,008.46
Total	6,125,941.34	1,275,679.70	334,140.11	7,735,761.15

RECAPITULATION—MONEY ACCOUNT.

Expended for special and general supplies received by Navy Yard Storekeepers	$3,223,622.80
Paid on Labor Rolls	4,179,472.21
Expended for construction and repair of ships, maintenance of yards, dry-docks, yard buildings, machinery plant, etc	4,512,138.35
Total	11,915,233.36

APPENDIX B.

Comparative statement by appropriations of expenditures during fiscal years 1889 *and* 1890.

Appropriations.	1889.			
	Amount of appropriation and credits by transfers, etc.	Expenditures to June 30.	Balance, June 30.	Approximate liabilities, June 30.
Increase of the Navy, vessels authorized March 3, 1885 (balance)	$414,902.52	$408,963.41	$5,939.11	....
Vessels and Monitors, act August 3, 1886 (balance)	1,228,397.50	822,089.50	406,308.00	$344,000.00
Increase of the Navy:				
Gun-boats and Cruisers, act March 3, 1887 (balance)	910,350.54	867,633.45	42,717.09	10,500.00
Vessels for Coast and Harbor Defense	1,000,000.00	17,816.43	982,183.57	....
Monitors and Vessels, acts March 3, 1885, August 3, 1886 (balance)	2,273,421.49	609,484.57	1,663,936.92	1,633,000.00
Construction and Machinery	3,500,000.00 4,055,000.00	855,290.52	6,699,709.48	2,400,000.00
Steel Practice Vessel	260,000.00	....	260,000.00	....
Naval Station, Pago Pago, Samoa	100,000.00	7,258.32	92,741.68	25,350.00
Increase of the Navy, Armor and Armament	2,000,000.00	....	2,000,000.00	....
Increase of the Navy, Armament (balance)	2,405,913.35	1,027,550.95	1,378,362.40	1,000,000.00
Ordnance and Ordnance Stores	254,327.28	234,384.89	19,942.39	16,000.00
Repairs, Ordnance	15,000.00	11,909.66	3,090.34	1,000.00
Civil Establishment (Ordnance)	24,525.00	23,847.54	677.46	9.83
Contingent, Ordnance	5,000.00	4,021.38	978.62	2,000.00
Torpedo Corps	65,836.38	47,692.34	18,144.04	17,000.00
Steel Cruisers, Ordnance (balance)	91,840.51	61,459.29	30,381.22	5,000.00
Breech-loading rifle cannon (balance)	11,687.67	2,650.00	9,037.67	....
Torpedoes	50,000.00	4,410.35	45,589.65	3,500.00
Testing Clark's Deflective Turret (balance)	3,576.50	1,811.80	1,764.70	....
Sale of Small Arms (balance)	1,959.22	9.61	1,949.61	....
Ordnance material, Proceeds of Sales (balance)	86,347.13	43,144.19	43,202.94	11,000.00
Steel Cruisers, Ordnance; gun carriages for Chicago (balance)	7,026.45	7,026.45	....	....
Maintenance of yards and docks	166,983.05	152,135.89	14,847.16	15,000.00
Repairs and Preservation Navy Yards	303,072.51	274,455.70	28,616.87	25,000.00
Civil Establishment, Yards and Docks	46,580.70	45,111.34	1,469.36	91.00
Contingent, Yards and Docks	20,000.00	19,087.16	912.84	900.00
Naval Home, Philadelphia, Pa	82,367.00	46,256.95	36,110.05	33,000.00
Navy Yards:				
Brooklyn, N. Y	143,671.37	71,186.16	72,485.21	35,000.00
Brooklyn, N. Y. (1887, balance)	7,286.64	3,065.75	4,220.89	....
Boston (water-pipes)	32,000.00	31,314.60	685.40	900.00
Boston (dry-dock, balance)	19,045.67	962.14	18,083.53	....
Norfolk, Va	114,927.68	29,742.09	85,185.59	2,200.00
Mare Island, Cal. (1886, balance)	19,191.31	1,418.56	17,772.75	....
Mare Island, Cal. (1887, balance)	32,106.60	26,161.20	5,945.40	5,945.40
Mare Island, Cal. (cisterns, balance)	932.02	931.52	.50	....
Mare Island, Cal	134,719.51	40,425.59	94,293.92	33,000.00
League Island	75,000.00	7,692.08	67,307.92	....
League Island (timber dry-dock)	550,000.00	27,269.25	522,730.75	521,550.00
Washington, D. C	1,000.00	....	1,000.00	1,000.00
Timber dry-docks (balance)	638,154.62	458,554.20	179,600.42	170,000.00
Naval Station and Coaling Depot, Port Royal, S. C	1,820.50	920.00	900.50	....
Commission on new navy yards and dry-docks	15,000.00	9,032.19	5,967.81	....
Adjustable Stern Dock	30,000.00	....	30,000.00	30,000.00
Electric lighting of navy yards	60,000.00	....	60.000.00	....
Equipment of Vessels	646,570.52	557,122.29	89,448.23	220,000.00
Transportation and Recruiting, Equipment and Recruiting	30,000.00	28,701.28	11,626.77	5,000.00
Contingent, Equipment and Recruiting	15,000.00	8,156.08	6,843.92	7,000.00
Civil Establishment, Equipment and Recruiting	11,525.00	11,426.21	98.79	....
Naval Training Station, Coasters Harbor Island, R. I	14,000.00	10,550.24	3,449.76	3,000.00
Construction and Repair (1889)	851,013.01	780,279.00	70,734.01	70,000.00
Construction and Repair (1889-'90)	150,000.00	140,904.94	9,095.06	9,000.00
Civil Establishment, Construction and Repair	20,162.01	19,924.95	237.06	....
Double Turreted Monitors (balance)	586.46	24.00	562.46	....
Repair of Vessels (balance)	4,262.00	2,[illegible].02	2,089.98	....
Improvement of Plant, Mare Island	100,000.00	[illegible]40	99,542.60	99,500.00
Steel Cruisers, Construction and Repair (balance)	1,[illegible]	[illegible]34	1,134.91	250.00

Comparative statement by appropriations of expenditures, etc.—Continued.

Appropriations.	1889.			
	Amount of appropriation and credits by transfers, etc.	Expenditures to June 30.	Balance June 30.	Approximate liabilities June 30.
Steel Cruisers, Equipment and Recruiting (balance)	$1,327.75	....	$1,327.75	$1,300.00
Steam Machinery	623,987.00	$559,492.78	64,494.22	65,000.00
Civil Establishment, Steam Engineering	17,018.63	16,923.13	95.50	....
Contingent, Steam Engineering	1,000.00	844.71	155.29	100.00
Provisions, Navy	1,067,270.61	682,488.78	384,781.83	415,000.00
Contingent, Provisions and Clothing (1889)	32,694.83	30,035.73	2,659.10	3,000.00
Contingent, Provisions and Clothing (1889–'90)	17,135.29	5,403.89	11,731.40	6,500.00
Civil Establishment, Provisions and Clothing	67,287.56	65,510.39	1,777.17	....
Clothing Fund	339,660.69	142,862.87	196,797.82	160,000.00
Small Stores Fund	103,593.00	46,885.38	56,707.62	60,000.00
Navigation and Navigation Supplies	92,025.07	86,389.39	5,635.68	15,000.00
Naval War College	10,000.00	5,558.29	4,441.71	1,000.00
Civil Establishment, Navigation	9,300.00	9,231.24	68.76	....
Contingent, Navigation	5,000.00	2,771.55	2,228.45	1,600.00
Ocean Surveys	10,517.16	9,255.12	1,262.04	2,300.00
Publication of Surveys of Mexican coast	5,000.00	4,895.59	104.41	....
New Naval Observatory (balance)	391,451.95	38,160.43	353,291.52	280,000.00
Steel Cruisers, Navigation (balance)	11,571.76	10,555.16	1,016.60	....
Naval Academy:				
Special Course	5,000.00	3,136.30	1,863.70	1,500.00
Repairs	21,000.00	14,614.91	6,385.09	6,400.00
Heating and Lighting	17,006.90	16,503.10	503.80	500.00
Miscellaneous	32,000.00	29,410.69	2,589.31	2,600.00
Library	2,000.00	1,570.43	429.57	425.00
Stationery	2,000.00	1,881.48	118.52	118.52
Chemistry	2,500.00	2,325.51	174.49	265.00
Stores	800.00	776.23	23.77	12.00
Materials	1,000.00	959.58	40.42	30.00
Board of Visitors	1,500.00	1,500.00	....	....
Boat house for Steam Launch	30,000.00	1,083.95	28,916.05	28,915.00
Total	26,024,843.28	9,655,564.38	16,369,278.90	7,812,161.75

NOTE.—The several increase of the Navy Appropriations, above, were not borne on the books of this Bureau until October 1, 1888, the balances of which on that date are taken as the starting point. Expenditures under the same from July 1 to September 30, 1888, are not included in the above $9,655,564.38.

Appropriation.	1890.			
	Amount of appropriation and credits, etc.	Expenditures to June 30.	Balance June 30.	Approximate liabilities June 30.
Increase of the Navy, Vessels, act March 3, 1885 (balance)	$5,953.43	$5,953.43	....	....
Vessels and Monitors, act August 3, 1886 (balance)	409,002.65	247,409.02	$161,593.63	$146,500.00
Increase of the Navy:				
Gun-boats and Cruisers, act March 3, 1887 (balance)	43,228.59	43,228.59	....	....
Vessels for Coast and Harbor Defense (balance)	982,291.57	449,192.64	533,098.93	438,000.00
Monitors and Vessels, acts March 3, 1885, and August 3, 1886 (balance)	1,665,630,91	1,126,277.67	539,353.24	500,000.00
Construction and Machinery	6,699,815.48	3,105,345.86	3,594,469.62	5,600,000.00
Steel Practice Vessel	260,000.00	....	260,000.00	....
Naval Station, Pago Pago, Samoa	92,741.68	24,291.95	68,449.73	4,491.00
Increase of the Navy, Armor and Armament	4,500,322.28	512,807.65	3,987,514.63	1,025,000.00
Increase of the Navy, Armament	1,384,111.55	1,055,752.88	328,358.67	260,000.00
Ordnance and Ordnance Stores	141,045.02	130,127.03	10,917.99	4,000.00
Repairs, Ordnance	15,000.00	8,944.77	6,055.23	2,550.00
Civil Establishment, Ordnance	24,525.00	20,998.66	3,526.34	....
Contingent, Ordnance	8,000.00	5,807.73	2,192.27	3,000.00
Torpedo Corps and War College	75,000.00	53,806.15	21,193.85	17,000.00
Steel Cruisers, Ordnance	30,381.22	18,552.15	11,829.07	2,800.00

Comparative statement by appropriations of expenditures, etc.—Continued.

Appropriations.	1890.			
	Amount of appropriation and credits by transfers, etc.	Expenditures to June 30.	Balance, June 30.	Approximate liabilities June 30.
Breech Loading Rifle Cannon	$9,037.67	$1,000.00	$8,037.67	$5,300.00
Torpedoes	45,664.15	4,920.30	40,743.85	4,000.00
Testing Clark's Deflective Turret	1,764.70	1,239.70	525.00	....
Sale of Small Arms	1,949.61	1,810.55	139.06	75.00
Ordnance material. Proceeds of Sales	43,514.24	32,883.61	10,630.63	25,700.00
Increase Navy Gun Plant, Navy Yard, Washington, D. C	625,001.59	149,122.23	475,879.36	8,000.00
Maintenance of Yards and Docks	166,509.56	144,623.42	21,886.14	21,000.00
Repairs and Preservation. Navy Yards	229,313.46	207,660.93	21,652.53	21,000.00
Civil Establishment, Yards and Docks	46,754.60	46,536.79	217.81	91.00
Contingent, Yards and Docks	20,000.00	9,449.26	10,550.74	125.00
Naval Home	68,517.44	57,441.35	11,076.09	10,000.00
Navy Yards:				
Brooklyn (balance, $72,485.21; appropriation, $55,001)	127,486.21	122,227.31	5,258.90	1,350.00
Brooklyn (1887)	4,220.89	3,985.50	235.39	....
Boston (water-pipes; deposit, $202.17)	887.57	887.57	....	....
Boston (dry-docks)	18,083.53	523.22	17,560.31	....
Norfolk	101,760.59	87,365.23	14,395.36	9,500.00
Mare Island (1886)	17,772.75	....	17,772.75	....
Mare Island (1887)	5,945.40	2,253.61	3,691.79	3,691.79
Mare Island (cisterns)	.50	.50	....	....
Mare Island	160,378.38	108,760.97	51,617.41	16,500.00
League Island	168,724.82	32,409.02	136,315.80	23,000.00
League Island (dry-dock)	522,730.75	310,894.32	211,836.43	210,663.23
Washington, D. C	16,000.00	15,983.85	16.15	....
Timber Dry Docks	179,600.54	179,357.90	242.64	....
Naval Station and Coaling Depot, Port Royal, S. C	2,900.50	2,900.00	.50	....
Commission on new Navy Yards and Dry Docks ($1,413.09; deposit)	7,380.90	2,901.67	4,479.23	....
Adjustable Stern Dock	30,000.00	27,000.00	3,000.00	3,000.00
Electric lighting of Navy Yards	60,000.00	16,607.75	43,392.25	....
Equipment of Vessels	705,709.41	385,630.05	320,079.36	365,000.00
Transportation and Recruiting, Equipment and Recruiting	30,114.46	29,609.12	505.34	1,500.00
Contingent, Equipment and Recruiting	15,001.08	9,595.75	5,405.33	5,000.00
Civil Establishment, Equipment and Recruiting	11,525.00	11,524.87	.13	....
Naval Training Station, Coasters Harbor Island, R. I	20,000.00	15,726.26	4,273.74	4,300.00
Construction and Repair (1890)	898,676.26	781,840.96	116,835.30	115,000.00
Construction and Repair (1889–'90)	9,103.17	9,103.17	....	....
Civil Establishment, Construction and Repair	19,972.50	19,737.82	234.68	....
Construction and Repair (deficiency act April 4, 1890)	50,000.00	40,922.87	9,077.13	4,000.00
Purchase or Construction of four Steam Tugs	140,000.00	35,185.35	104,814.65	....
Improvement of Plant, Mare Island	99,542.60	55,829.34	43,713.26	43,630.00
Steel Cruisers, Construction and Repair	1,134.91	245.00	889.91	....
Steel Cruisers, Equipment and Repair	1,327.75	1,327.75	....	....
Steam Machinery	619,671.87	532,320.33	87,351.54	85,000.00
Civil Establishment, Steam Engineering	17,000.00	16,728.58	271.42	....
Contingent, Steam Engineering	1,000.00	686.34	313.66	275.00
Provisions, Navy	1,061,667.67	932,241.06	129,426.61	100,000.00
Contingent, Provisions and Clothing (1890)	40,382.20	28,962.23	11,419.97	6,000.00
Contingent, Provisions and Clothing (1889–'90)	11,731.40	10,035.51	1,695.89	700.00
Civil Establishment, Provisions and Clothing	66,510.03	66,073.98	436.05	....
Clothing Fund	382,481.66	310,743.60	71,738.06	30,000.00
Small Stores' Fund	102,158.96	73,003.53	29,155.43	31,000.00
Navigation and Navigation Supplies	107,107.65	76,448.19	30,659.46	27,500.00
Purchase of land adjacent to Naval Academy	90,000.00	....	90,000.00	....
Civil Establishment, Navigation	9,000.00	8,757.49	242.51	....
Contingent, Navigation	5,000.41	3,845.31	1,155.10	1,100.00
Ocean Surveys	7,370.27	7,333.50	36.77	300.00
Publication of Surveys	5,000.00	4,674.65	325.35	....
New Naval Observatory	353,291.52	140,391.92	212,899.60	173,000.00
Steel Cruisers, Navigation	1,266.60	465.08	801.52	....
Special Course, Naval Academy	5,000.00	2,199.41	2,800.59	2,800.00
Repairs, Naval Academy	21,000.00	18,751.17	2,248.83	3,000.00
Heating and Lighting, Naval Academy	17,750.02	16,494.63	1,255.39	1,200.00
Furniture for Cadets' Quarters	2,500.00	2,499.92	.08	....
Contingent, Naval Academy	41,800.00	37,402.41	4,397.59	4,000.00
Building, Naval Torpedo Station	100,000.00	....	100,000.00	....
Observation of Eclipse of the Sun December 22, 1889	5,000.00	4,525.06	474.94	425.00

Comparative statement by appropriations of expenditures, etc.—Continued.

Appropriations.	1890.			
	Amount of appropriation and credits by transfers, etc.	Expenditures to June 30.	Balance, June 30.	Approximate liabilities, June 30.
Machinery, Double Turreted Monitors	$58, 756. 69	$54, 974. 77	$3, 781. 92	....
Improvement of Construction Plant, Brooklyn	50, 000. 00	28, 090. 63	21, 909. 37	$21, 326. 19
Improvement of Construction Plant, Norfolk	50, 000. 00	16, 369. 48	33, 630. 52	33, 175. 60
Boat House for Steam Launch, Naval Acade'y	28, 916. 73	28, 915. 38	1. 35	....
Navy Yard, Boston, Mass	28, 610. 00	25, 694. 92	2, 915. 08	2, 700. 00
Naval Station, Key West, Fla	8, 000. 00	6, 740. 10	1, 259. 90	1, 170. 00
Naval Proving Ground	40, 000. 00	9, 036. 92	30, 963. 08	100. 00
Testing American Armor (balance)	24, 917. 03	3, 914. 94	21, 002. 09	5, 300. 00
Increase of Navy, Armor and Gun Steel (balance)	3, 998, 431. 10	128, 042. 38	3, 870, 388. 72	3, 340, 000. 00
Wire Wound Gun	4, 000. 00	600. 00	3, 400. 00	81. 60
Ammunition for the Vesuvius	12, 000. 00	....	12, 000. 00	975. 00
Modern Guns and Ammunition	105, 000. 00	13, 905. 61	91, 094. 39	21, 000. 00
Rapid Twist Guns and Re-inforce Cartridges	50, 000. 00	....	50, 000. 00	....
	28, 553, 878. 68	12, 386, 390. 08	16, 106, 988. 60	13, 357, 000. 00
MISCELLANEOUS.				
Appropriations, Bureau of Medicine and Surgery	447, 760. 59	187, 105. 77	260, 654. 82	....
Annual appropriations fiscal year 1889	814, 134. 47	771, 058. 01	43, 076. 46	157, 000. 00
Annual appropriations fiscal year 1888 and prior years, carried to surplus fund	398, 033. 40	35, 466. 72 64, 020. 47	298, 546. 21	....
Totals	30, 213, 807. 14	13, 444, 041. 05	16, 769, 266. 09	13, 514, 000. 00

Expenditures from annual appropriations of 1889 *during fiscal year* 1890.

Appropriations, 1889.	Unexpended balances June 30, 1889, and credits since.	Expended 1890.	Balance June 30, 1890.
Maintenance, Yards and Docks	$15, 385. 87	$14, 631. 34	$754. 53
Repairs and Preservation	31, 385. 61	23, 713. 42	7, 672. 19
Contingent, Yards and Docks	920. 14	912. 75	7. 39
Naval Asylum, Philadelphia, Pa	36, 146. 45	31, 792. 55	4, 353. 90
Equipment of Vessels	100, 378. 09	100, 360. 45	17. 64
Transportation and Recruiting, Equipment and Recruiting	3, 017. 69	2, 713. 00	304. 69
Contingent, Equipment and Recruiting	6, 945. 07	6, 798. 31	146. 76
Naval Training Station, Coaster's Harbor Island, R. I	3, 449. 76	2, 962. 25	487. 51
Navigation and Navigation supplies	6, 553. 24	6, 458. 79	94. 45
Contingent, Navigation	2, 231. 45	1, 587. 92	643. 53
Naval War College	4, 441. 71	696. 45	3, 745. 26
Ordnance and Ordnance stores	20, 629. 02	13, 395. 96	7, 233. 06
Repairs, Ordnance	3, 153. 83	891. 39	2, 262. 44
Contingent, Ordnance	1, 826. 80	1, 803. 80	23. 00
Torpedo Corps	18, 176. 99	16, 710. 10	1, 466. 89
Construction and Repair	76, 346. 26	67, 803. 30	8, 542. 96
Steam Machinery	66, 827. 84	63, 304. 93	3, 522. 91
Contingent, Steam Engineering	155. 29	101. 25	54. 04
Provisions, Navy	400, 651. 33	400, 623. 83	27. 50
Contingent, Provisions and Clothing	3, 182. 05	3, 016. 32	165. 73
Naval Academy:			
Repairs	6, 385. 09	6, 379. 01	6. 08
Miscellaneous	2, 589. 62	2, 576. 16	13. 46
Heating and Lighting	503. 80	483. 53	20. 27
Library	429. 57	387. 32	42. 25
Stationery	118. 52	118. 52	....
Chemistry	264. 49	264. 49	....
Stores	23. 77	12. 63	11. 14
Materials	40. 42	29. 90	10. 52
Special Course	1, 974. 70	529. 34	1, 445. 36

APPENDIX C.

Statement of expenditures of Labor and Material at Shore Stations and objects to which applied.

TITLES A AND D.—COST OF CONSTRUCTION AND REPAIR OF VESSELS.

Vessels.	Labor.	Money vouchers.	Material.	Total.
Newark	$26,030.15	$430,430.00	$0.32	$456,460.47
Charleston	88,844.59	253,532.48	16,275.16	358,652.23
Yorktown	14,007.94	47,737.83	2,170.37	63,916.14
Petrel	33,025.13	24,067.75	5,964.23	63,067.11
Baltimore	41,746.21	407,173.43	6,274.87	455,194.51
Vesuvius	4,922.68	....	6.30	4,928.98
Maine	350,511.37	198,456.65	131,732.15	680,700.17
Texas	113,814.68	114,210.00	12,901.59	240,926.27
Cushing	1,410.22	48,975.29	....	50,385.51
Puritan	38,542.51	....	500.52	39,043.03
Monadnock	67,266.05	....	40,945.23	108,211.28
Amphitrite	15,754.82	64,030.66	1,404.69	81,190.17
Terror	82,918.51	82,350.00	8,735.37	174,003.88
Philadelphia	38,172.15	237,450.00	6,213.70	281,835.85
San Francisco	35,794.70	533,243.98	4,731.83	573,770.51
Concord	12,168.43	65,068.00	1,812.43	79,048.86
Bennington	10,613.67	44,100.00	1,252.06	55,965.73
Miantonomoh	138,627.51	....	11,236.62	149,864.13
Monterey	9,264.51	489,816.50	....	449,081.01
Armored Cruiser No. 2	11,763.61	....	....	11,763.61
Protected Cruiser No. 6	8,257.54	....	....	8,257.54
Protected Cruiser No. 7	67,424.03	....	26,922.47	94,346.50
Protected Cruiser No. 8	75,940.06	....	21,637.55	97,577.61
Protected Cruiser No. 9	3,545.31	82,687.50	....	86,232.81
Protected Cruiser No. 10	3,489.32	82,687.50	....	86,176.82
Protected Cruiser No. 11	3,460.56	....	....	3,460.56
Practice Cruiser	3,151.08	....	....	3,151.08
Steel Cruising Monitor	2,905.20	....	....	2,905.20
Gun boat No. 5	2,570.19	....	....	2,570.19
Gun boat No. 6	2,440.72	....	....	2,440.72
Harbor Defense Ram	1,272.60	....	....	1,272.60
Triton	4,497.80	35,000.00	257.75	39,755.55
Chicago	26,191.22	3,614.26	6,178.39	35,983.87
Lancaster	73,119.60	....	26,771.47	99,891.07
Brooklyn	10,172.33	....	751.93	10,924.26
Pensacola	34,125.55	157.00	9,056.72	43,339.27
Atlanta	3,798.36	544.20	1,139.22	5,481.78
Boston	7,358.70	....	1,657.69	9,016.39
Hartford	178.77	....	....	178.77
Omaha	61.20	....	....	61.20
Ajax	6.18	....	....	6.18
Jason	24.32	....	....	24.32
Nantucket	1,901.98	....	39.58	1,941.56
Juniata	2,443.85	....	5.60	2,449.45
Ossipee	7,066.58	....	510.26	7,[illegible].84
Quinnebaug	1,244.66	....	49.86	1,[illegible].52
Galena	13,107.56	....	6,676.79	19,[illegible]
Marion	468.87	....	....	[illegible]
Mohican	9.05	....	....	[illegible]
Iroquois	22,948.12	....	4,942.37	[illegible]
Kearsarge	1,723.76	432.00	296.32	[illegible]
Dolphin	6,884.43	....	1,063.90	[illegible]
Adams	21.50	....	27.70	[illegible]
Alliance	48,873.69	....	12,517.52	[illegible]
Essex	68,674.07	....	14,081.01	[illegible]
Enterprise	12,442.94	....	1,414.49	[illegible].43
Nipsic	15.[illegible]	....	....	[illegible].16
Tallapoosa	....	750.00	....	[illegible].00
[illegible]	13,572.45	....	3,428.79	[illegible].24
[illegible]	20,735.[illegible]	....	3,684.40	[illegible]79.41
Ranger	15,314.[illegible]	....	2,305.45	[illegible]
[illegible]	17,253.8[illegible]	....	1,[illegible]	[illegible]
[illegible]	5,636.4[illegible]	....	[illegible]	[illegible]
[illegible]	[illegible]	....		[illegible]
[illegible]	22,[illegible]	....	3,[illegible]	[illegible]
[illegible]	[illegible].28	....	[illegible]	[illegible]
[illegible]	2,002.[illegible]	....		2,[illegible]
[illegible]	[illegible].34	....		
[illegible]	1,[illegible].35	....		[illegible]
[illegible]	[illegible]	....		
[illegible]	[illegible]			
[illegible]	[illegible]			[illegible]
[illegible]				[illegible]

Statement of expenditures of Labor and Material at Shore Stations, etc.—Continued.

TITLES A AND D.—COST OF CONSTRUCTION AND REPAIR OF VESSELS.

Vessels.	Labor.	Money vouchers.	Material.	Total.
Speedwell	$680.04		$90.03	$770.07
Standish	1,231.09		294.44	1,525.53
Triana	224.01			224.01
Vermont	1,204.98		1,304.39	2,509.37
Independence	1,998.30		814.38	2,812.68
Constitution	729.09		15.34	744.43
Monongahela	2,193.71		314.52	2,508.23
Constellation	9,885.84		5,402.24	15,288.08
Jamestown	2,736.49		803.97	3,540.46
Portsmouth	4,985.51		789.96	5,775.47
Saratoga	31,906.16		8,792.22	40,698.38
Dale	1,537.74		395.47	1,933.21
Franklin	2,531.03		217.80	2,748.83
Minnesota	1,441.24		532.61	1,973.85
Wabash			10.89	10.89
Saugus	10.26			10.26
Rescue	40.42			40.42
Monocacy	357.77			357.77
New Tugs	2,049.33			2,049.33
Phlox	142.52		5.40	147.92
Total	1,824,778.96	$3,196,505.03	429,920.07	5,451,204.06

TITLE E.—REAL ESTATE AND CHATTELS.

Objects.	Labor.	Money vouchers.	Material.	Total.
Navy Yard, Boston:				
Wet Dock	$166.40			$166.40
Buildings L, M, N, O		$24,252.32	$1,287.42	25,539.74
Torpedo Station, Newport:				
Surgeon's quarters		7,150.00		7,150.00
Navy Yard, New York:				
Whitney Basin	21,061.29		19,417.17	40,478.46
Building No. 28	28,357.84	19,325.29	7,319.40	55,002.53
Building No. 7	5,819.36	2,044.20	8,557.62	16,421.18
New Sheds	15,970.39		6,421.00	22,391.39
Cranes	2,596.17			2,596.17
Electric light	1,549.84			1,549.84
Railroad	5,676.68		8,941.84	14,618.52
Erecting Shop	4,592.30		870.80	5,463.10
Recreation Hall	90.79			90.79
Timber Dry-Dock	39.59	140,963.84		141,003.43
Commandant's launch	84.10			84.10
Anchor Hoy			545.40	545.40
Wallabout channel		11,107.64		11,107.64
Civil Engineer's house		9,087.80		9,087.80
Miscellaneous			2,799.19	2,799.19
Navy Yard, League Island.				
Dry Dock		279,470.09		279,470.09
Protection Wall	4,999.67	13,396.80		18,396.47
Naval Academy, Annapolis:				
New Boat-house		19,189.93		19,189.93
Navy Yard, Washington:				
Fire-alarm		1,000.00		1,000.00
Branch Railroad	1,536.84	11,597.89		13,134.73
Electric light	61.49	14,148.98		14,210.47
North Gun-shop	16,957.81	26,641.75	782.55	44,382.11
South Gun-shop	13,182.16	11,448.82	403.85	25,034.83
Gun-carriage shop	16,173.54	7,171.98	174.54	23,520.06
Boiler-house	2,787.98			2,787.98
New Office	23,568.64		1,479.24	25,047.88
Dynamo-house	1,840.22			1,840.22
Miscellaneous	22,010.89		27,422.24	49,433.13
New Naval Observatory		140,009.07		140,009.07
Naval Proving Ground		9,020.00		9,020.00
Navy Yard, Norfolk:				
Timber Dry Dock	183.92	67,367.01		67,550.93
Iron and Steel Shop	8.36	66,491.51	12,000.00	78,499.87
Officers' quarters		4,220.69		4,220.69
Railroad extension	2,468.25			2,468.25
Water system	2,310.45			2,310.45

Statement of expenditures of Labor and Material at Shore Stations, etc.—Continued.

TITLE E.—REAL ESTATE AND CHATTELS—Continued.

Objects.	Labor.	Money vouchers.	Material.	Total.
Navy Yard, Norfolk:				
Boiler-shop	$5,669.49			$5,669.49
New Sheds	2,623.02		$1,367.97	3,990.99
Engineer's Office	126.69			126.69
New Copper-shop	513.58			513.58
Sheers			14,944.00	14,944.00
Miscellaneous	4,857.97		5,523.80	10,381.77
Naval Station, Port Royal, S. C.:				
Water tank		$215.00		215.00
Naval Station, Key West, Fla.:				
Cisterns		500.00		500.00
Stern Dock		27,000.00		27,000.00
Officers' quarters		6,740.10		6,740.10
Navy Yard, Mare Island:				
Dry Dock	46,780.77		6,835.13	53,615.90
Coal Wharf	5,591.94		1,038.33	6,630.27
Pile Driver	1,072.66		2,032.15	3,104.81
Crane Scow	1,559.01		3,168.67	4,727.68
Boiler and Machine Shops	1,760.28		339.54	2,099.82
Iron Plating Shop	1,775.44		147.90	1,923.34
Mud Scow	2,874.34		307.98	3,182.32
Swinging Crane	2,241.60		193.20	2,434.80
New roads, etc	3,524.26			3,524.26
Cisterns			233.33	233.33
Quay Wall	6,668.66		9,679.33	16,347.99
Miscellaneous			732.26	732.26
Total	281,734.68	919,560.21	144,965.85	1,346,260.74

TITLE F.—MACHINERY PLANT.

Objects.	Labor.	Money vouchers.	Material.	Total.
Navy Yard, Portsmouth:				
Construction and Repair	52.39		345.95	398.34
Steam Engineering	361.47			361.47
Torpedo Station, Newport			206.35	206.35
Navy Yard, New York:				
Construction and Repair	30,505.77	720.00	53,062.10	84,287.87
Steam Engineering	6,291.26		9,200.00	15,491.26
Navy Yard, Washington, Ordnance	140,615.26	2,882.00	15,894.34	159,391.60
Navy Yard Norfolk:				
Construction and Repair	2,483.90		23,767.74	26,251.64
Steam Engineering	8,790.92		3,092.80	11,883.72
Navy Yard, Mare Island				
Yards and Docks			181.20	181.20
Construction and Repair			485.04	485.04
Steam Engineering			904.50	904.50
Total	189,103.97	3,602.00	107,140.02	299,845.99

TITLE G.—GENERAL MAINTENANCE.

Objects.	Labor.	Money vouchers.	Material.	Total.
Navy Yard, Portsmouth	73,223.36	571.18	24,399.89	98,194.43
Navy Yard, Boston	74,807.50	2,783.15	27,788.33	105,378.98
Naval Magazine, Chelsea	428.88	40.88		469.76
Nitre Depot, Malden		12.50		12.50
Torpedo Station, Newport	35,439.92	5,928.27	2,881.39	44,249.58
Naval Training Station, Newport	6,815.09	977.78	33,144.11	40,936.98
Naval War College, Newport		14.65		14.65
Naval Station, New London	7,094.20	1,039.30	1,096.27	9,229.77
Navy Yard, New York	230,929.89	6,877.31	112,587.35	350,394.55
Navy Yard, League Island	84,678.74	3,310.05	8,172.44	96,161.23
Naval Home, Philadelphia	15,196.29	72,568.70		87,764.99
Naval Academy, Annapolis	54,088.86	6,789.58	74,826.90	135,705.29
Naval Ordnance Proving Ground	19,253.07		27,794.72	47,047.79
Navy Yard, Washington	84,062.58	1,637.88	12,785.89	98,486.35
Naval Magazine, Bellevue	1,631.88	4.00		1,635.88
Navy Yard, Norfolk	111,471.58	3,252.52	50,509.52	[illegible]
Naval Station, Port Royal	1,760.37	2,059.88		3,820.25
Naval Station, Key West	6,181.02	799.70	1,174.53	8,155.25
Navy Yard, Pensacola	28,616.24	540.00	5,327.00	34,483.24
Navy Yard, Mare Island	204,055.15	6,419.31	116,880.18	[illegible]

Statement of expenditures of labor and material at shore stations, etc.—Continued.

TITLE G.—GENERAL MAINTENANCE—Continued.

Objects.	Labor.	Money vouchers.	Material.	Total
Naval Hospital, Widows Island, Me	$1,125.00	$2,124.63		$3,249.63
Naval Hospital, Portsmouth	683.44	1,292.29		1,975.73
Naval Hospital, Chelsea	3,302.28	15,306.20		18,608.48
Naval Hospital, New York	4,709.44	24,066.32		28,775.76
Naval Laboratory, New York	3,900.00	19,434.98		23,334.98
Naval Hospital, Philadelphia	3,164.93	11,910.80		15,075.73
Naval Hospital, Annapolis	600.00	299.74		899.74
Naval Hospital, Washington	1,800.00	3,849.13		5,649.13
Naval Dispensary, Washington		4,430.76		4,430.76
Museum of Hygiene, Washington	1,181.66	2,164.30		3,345.96
Naval Hospital, Norfolk	3,920.14	26,747.05		30,667.19
Naval Hospital, Pensacola	660.00	903.12		1,563.12
Naval Hospital, Mare Island	4,449.81	6,531.53		10,981.34
Sackett's Harbor, N. Y		273.00		273.00
Baltimore, Md	618.90			618.90
Erie, Pa		250.00		250.00
Hydrographic Office, Washington		4,218.68		4,218.68
Total	1,069,850.22	239,429.12	$499,429.12	1,808,708.46

TITLE I.—SPECIAL DUTY.

Eclipse of the Sun Expedition		2,637.14		2,637.14
Longitude Party		194.47		194.47
Total		2,831.61		2,831.61

TITLE V.—MISCELLANEOUS.

Advertising		17,402.30		17,402.30
Telegraphing		343.97		343.97
Freight and transportation of stores		65,208.36		65,208.36
Transportation of enlisted men		25,855.28		25,855.28
Miscellaneous	40,161.95	41,400.47	2,758.18	84,320.60
Total	40,161.95	150,210.38	2,758.18	193,130.51

TITLE Z.—CONVERSION ACCOUNT.

Bureau of Yards and Docks:				
Navy Yard, Washington	39.26			39.26
Bureau of Equipment and Recruiting:				
Navy Yard, Portsmouth	60.62		11,500.69	11,561.31
Navy Yard, Boston	115,096.17		86,084.56	201,180.73
Navy Yard, New York	31,171.67		56,578.05	87,749.72
Navy Yard, League Island			1,379.06	1,379.06
Navy Yard, Washington	420.49			420.49
Navy Yard, Norfolk	7,113.30		18,402.33	25,515.63
Navy Yard, Mare Island	23,262.82		33,175.29	56,438.11
Bureau of Navigation:				
Navy Yard, Washington	1.17			1.17
Navy Yard, Norfolk	233.14		30.23	263.37
Bureau of Ordnance:				
Navy Yard, Portsmouth	33.28		3.52	36.80
Navy Yard, Boston	59.84		1.96	61.80
Torpedo Station, Newport	1,911.20		5,216.06	7,127.26
Navy Yard, New York	4,283.13		7,043.32	11,326.45
Navy Yard, Washington	357,350.26		583,370.11	940,720.37
Navy Yard, Norfolk	426.61		30,202.24	30,628.85
Navy Yard, Mare Island	958.94		40,440.48	41,399.42
Bureau of Construction and Repair:				
Navy Yard, Portsmouth	41,761.17		6,824.73	48,585.90
Navy Yard, Boston	576.68		53.78	630.46
Navy Yard, New York	49,799.03		18,948.00	68,747.03
Navy Yard, League Island			5,298.93	5,298.91
Navy Yard, Washington	7,801.04		18,724.37	26,525.44
Navy Yard, Norfolk	12,916.70		4,741.94	17,658.64
Navy Yard, Mare Island	5,438.29		4,539.49	9,977.78

Statement of expenditures of labor and material at shore stations, etc.—Continued.

TITLE Z.—CONVERSION ACCOUNT—Continued.

Objects.	Labor.	Money vouchers.	Material.	Total.
Bureau of Steam Engineering:				
Navy Yard, Portsmouth	$17,148.17		$5,018.03	$22,166.20
Navy Yard, New York	20,545.41		1,816.86	22,362.27
Navy Yard, League Island			3,306.13	3,306.73
Navy Yard, Washington	110.47		72.12	181.59
Navy Yard, Norfolk	15,734.92		4,572.23	20,307.15
Navy Yard, Mare Island	18,362.48		2,139.83	20,502.31
Bureau of Provisions and Clothing:				
Navy Yard, New York	38,752.88		100,808.75	139,561.63
Total	771,369.14		1,050,293.09	1,821,662.23

RECAPITULATION.

Titles A and D.—Cost and Valuation, and Repairs of Ships	1,824,778.96	$3,196,505.03	429,920.07	5,451,204.06
Title E.—Real Estate and Chattels	281,734.68	919,560.21	144,965.85	1,346,260.74
Title F.—Machinery Plant	189,103.97	3,602.00	107,140.02	299,845.99
Title G.—General Maintenance	1,069,850.22	239,429.12	499,429.12	1,808,708.46
Title I.—Special Duty (Eclipse of the Sun Expedition and Longitude Party)		2,831.61		2,831.61
Title N.—Models and Experiments	2,473.29		4,038.97	6,512.26
Title V.—Miscellaneous (advertising, telegraphing, freight, transportation, etc.)	40,161.95	150,210.38	7,758.18	198,130.51
Title Z.—Conversion Account (labor and material expended for manufacture)	771,369.14		1,050,293.09	1,821,662.23
Expended for specific objects (as above)	4,179,472.21	4,512,138.35	2,288,545.30	10,980,155.86

APPENDIX D.

Statement of appropriation, "Provisions Navy, 1890."

CREDITS.

1890. June 30.	By appropriation for provisions	$954,000.00	
	By appropriation for fresh water	11,000.00	
	By appropriation for labor	90,000.00	
		1,055,000.00	
	By proceeds of sales of provisions to date	6,667.67	
	Total credits		$1,061,667.67

DEBITS.

To settlements by accounting officers of Treasury	686,193.41	
To advances to pay officers at navy-yards, for payment of bills, labor, etc	246,047.65	
		932,241.06
By balance in Treasury		129,426.61

Expenditures and liabilities in detail.

Ashore:		
Payments for provisions	132,228.22	
Payments for commuted rations at stations	26,008.60	
Payments for labor in storehouses and yards	83,452.93	
Payments for incidental expenses store houses and yards	1,157.80	
Payments for fresh water for ships use	3,200.10	
		246,047.65
Afloat:		
Purchases of provisions by ships in commission	139,967.45	
Purchases of fresh water by ships in commission	2,044.51	
Commuted rations to officers, crew and marines	670,206.90	
Commuted rations stopped and credited to hospital fund, on account of sick in hospital (approximate)	16,500.00	
		828,718.86
Deliveries and reservations due on contracts and approved open-purchase requisitions (approximate)		18,673.35
Total liabilities authorized		1,093,439.86
Total payments to date as above		932,241.06
Liabilities outstanding (approximate)		161,198.80
By balance in Treasury	129,426.61	
By balance in hands of pay officers	1,209.61	
By balance due account sales to messes, etc	5,227.48	
		135,863.70
Apparent deficiency		25,335.10

APPENDIX E.

Statement of Contingent, Provisions and Clothing, 1890.

CREDITS.

1890. June 30.	By amount of appropriation	$40,000.00	
	By proceeds of sales contingent stores to date	382.20	
			$40,382.20

DEBITS.

To payment of contingent expenses ashore	24,148.10	
To settlements by accounting officers	4,814.13	
		28,962.23
By balance in Treasury		11,419.97

Expenditures authorized, in detail.

Ashore:		
Freight and express charges	$4,332.01	
Newspapers and advertising	1,061.18	
Blank-books and stationery	5,706.73	
Postage, telegrams,* and telephones	852.20	
Tolls, ferriages, and car-fare	362.15	
Office furniture and fixtures	1,654.37	
Ice	243.44	
Fuel	2,753.06	
Candles	3,923.18	
Miscellaneous	2,259.78	
Advances to Navy Pay Office, San Francisco	1,000.00	
		$24,148.10
Afloat:		
Freight, lighterage, etc	2,652.09	
Postage and telegrams	1,844.07	
Blank books, stationery, and printing	554.79	
Candles	790.75	
Miscellaneous	229.08	
		6,070.78
Bonded and land-grant railroad claims (approximate)		1,200.00
Due on account contracts, reservations, and approved requisitions (approximate)		4,500.00
Total liabilities authorized		35,918.88
Total payments as above		28,962.23
Total liabilities outstanding		6,956.65
Balance in Treasury	$11,419.97	
Balance in hands of Pay Officers	1,000.00	
Balance due account sales, unsettled	225.00	
		12,644.97
Less above liabilities		6,956.65
Approximate final balance		5,688.32

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* Telegraph account for 1890 not yet paid.

APPENDIX F.

Statement of Clothing Fund for fiscal year ending June 30, 1890.

ASSETS AND LIABILITIES JUNE 30, 1889.

Balance in Treasury to credit of Clothing Fund	$196,797.82	
Balance in hands of paymaster at Navy Yard, New York	3,183.07	
		$199,980.89
Clothing on hand in store	344,822.14	
Clothing in transit	12,333.92	
Clothing at the Clothing Factory	10,805.44	
Clothing on board ships in commission	256,844.21	
Clothing condemned to be sold	1,899.48	
		626,705.19
Accounts receivable awaiting adjustment by the Fourth Auditor		141,414.69
Total assets		968,100.77
Due for reservations and bills for clothing delivered		29,984.58
Balance June 30, 1889		938,116.19

CLOTHING-FUND ACCOUNT.

Debits:		
Clothing Fund July 1, 1889		938,116.19
Accounts receivable subject to settlement by the Fourth Auditor		230,390.03
Clothing received:		
Purchased at Navy Yards and Stations	246,383.57	
Purchased by Pay Officers on ships	1,587.29	
Pay-roll at Clothing Factory (labor)	40,143.54	
		288,114.40
Purchases and payments:		
Due for clothing July 1, 1889	29,984.58	
Due for accounts adjusted and settled	2,151.21	
Due for purchases in fiscal year, 1890	288,114.40	
		320,250.19
Net gains to Clothing Fund		356.05
Total debits		1,777,226.86
Credits:		
Due for purchase of clothing in 1890		288,114.40
Clothing expended:		
Issued to crew and marines	209,828.07	
Clothing sold at auction (net value)	20,183.27	
Sales to other departments	334.51	
Deficits in Pay Officers' clothing accounts	44.18	
		230,390.03
Purchases and payments:		
Payments made for clothing	313,416.73	
Balance due on clothing	6,833.46	
		320,250.19
Losses:		
Through deserters	1,937.11	
Issued gratuitously to destitute seamen	15.79	
Expense account	2,408.37	
Loss on issues to crew and marines	4.27	
Loss on sales at auction	21,566.74	
Loss on condemnations by surveys	1,538.26	
		27,470.54
Balance, Clothing Fund, June 30, 1890		911,001.70
Total credits		1,777,226.86

Statement of assets and liabilities, June 30, 1890.

Balance in Treasury to credit of Clothing Fund		$71,738.06
Balance in hands of Paymaster at Navy Yard, New York		339.53
		72,077.59
Clothing on hand in store	$382,966.66	
Clothing in transit	4,456.27	
Clothing at the Clothing Factory	13,231.98	
Clothing on board ships in commission	239,202.79	
Clothing condemned to be sold	2,061.46	
		641,919.16
Accounts receivable—for issues and sales awaiting adjustment by Fourth Auditor		183,536.95
Clothing outfits issued to apprentices upon enlistment (act approved March 2, 1889)		20,301.46
Total assets		917,835.16
Due for reservations and bills for clothing delivered	6,826.96	
Due for labor at Clothing Factory (unpaid)	6.50	
Total liabilities	6,833.46	6,833.46
Clothing fund June 30, 1890		911,001.70

Clothing in transit, June 30, 1890.

EXPENDITURES.

Third quarter, from Jas. E. Tolfree, General Storekeeper, New York, to Jas. S. Phillips, U. S. S. Palos	$817.53
Fourth quarter:	
From W. W. Williams, General Storekeeper, Mare Island—	
To H. T. Stancliff, U. S. S. Swatara	72.40
To E. B. Webster, U. S. S. Pinta	93.00
From Jas. E. Tolfree, General Storekeeper, New York—	
To W. B. Wilcox, U. S. S. Tallapoosa	1,961.49
To Reah Frazier, U. S. S. Alliance	133.46
To E. B. Rodgers, U. S. S. Kearsarge	1,161.91
To L. G. Boggs, U. S. S. New Hampshire	339.00
From Geo. W. Simpson, U. S. S. Jamestown, to L. G. Boggs, U. S. S. New Hampshire	8.73
Total	4,587.52

RECEIPTS.

Fourth quarter, Geo. W. Simpson, U. S. S. Jamestown, from L. G. Boggs, U. S. S. New Hampshire	131.25
Balance June 30, 1890	4,456.27
Total	4,587.52

APPENDIX G.

Statement of Small Stores Fund for fiscal year ending June 30, 1890.

ASSETS AND LIABILITIES, JUNE 30, 1889.

Balance in Treasury to credit of Small Stores Fund		$56,707.[illegible]
Small Stores on hand in store	$72,842.61	
Small Stores in transit	1,222.54	
Small Stores on board ships in commission	61,894.69	
		135,959.84
Accounts receivable awaiting adjustment by the Fourth Auditor		36,171.57
Total assets		228,839.03
Due for reservations and bills for small stores delivered		3,112.09
Balance June 30, 1889		225,726.94

SMALL-STORES FUND ACCOUNT.

Debits:		
Small Stores Fund, July 1, 1889		225,726.94
Accounts receivable subject to settlement by the Fourth Auditor		60,651.12
Received:		
Purchased at Navy-Yards and Stations	$68,800.59	
Purchased by Pay Officers on ships	3,665.89	
		72,466.48
Purchases and payments:		
Due for Small Stores, July 1, 1889	3,112.09	
Add adjustments to debit of Small Stores Fund	136.00	
	3,248.09	
Due for purchases in fiscal year 1890	72,466.48	
		75,714.57
Gains to Small Stores Fund		2,967.00
Total debits		437,526.11
Credits:		
Due for purchase of Small Stores in 1890		72,466.48
Expended:		
Issued to crew and marines	$57,160.87	
Small stores sold at auction (net value)	1,005.18	
Sales to other departments	213.62	
Sales for cash	2,271.45	
		60,651.12
Purchases and payments:		
Payments made for small stores	72,903.53	
Balance due on small stores	2,811.04	
		75,714.57
Losses:		
Issued gratituously to destitute seamen	1.45	
Expense account	100.00	
Reduction in price of ditty boxes	5,366.96	
Loss on issue to crew and marines	28.20	
Loss on sales at auction	3,170.17	
Loss on condemnations by surveys	1,097.73	
		9,764.51
Balance Small Stores Fund, June 30, 1890		218,929.43
Total credits		437,526.11

Statement of assets and liabilities, June 30, 1890.

Balance in Treasury to credit of Small Stores Fund		29,155.43
Small Stores on hand and in store	$88,862.90	
Small Stores on board ships in commission	48,345.63	
Small Stores condemned to be sold	452.66	
Small Stores in transit	1,295.73	
		138,956.92
Accounts receivable for issues and sales awaiting adjustment by Fourth Auditor		53,628.12
Total assets		221,740.47
Due for reservations and bills for small stores delivered		2,811.04
Small Stores Fund, June 30, 1890		218,929.43

Small Stores in transit, June 30, 1890.

EXPENDITURES.

Third quarter, from Jas. E. Tolfree, General Storekeeper, New York, to Jas. Hoy, U. S. S. Richmond	$101.85
Third quarter, from Jas. E. Tolfree, General Storekeeper, New York, to Jas. S. Phillips, U. S. S. Palos	216.83

Fourth quarter:	
From W. W. Williams, General Storekeeper, Mare Island, to H. T. Stancliff, U. S. S. Swatara	41.33
From Jas. E. Tolfree, General Storekeeper, New York—	
To W. B. Wilcox, U. S. S. Tallapoosa	386.62
To E. B. Rogers, U. S. S. Kearsarge	463.22
To Geo. W. Simpson, U. S. S. Jamestown	85.86
Total	1,295.73

Clothing and Small Stores Fund.

Consolidation of the Clothing Fund and Small Stores Fund, under act approved June 30, 1890.

Clothing Fund	$911,001.70
Small Stores Fund	218,929.43
Consolidated Fund July 1, 1890	1,129,931.13

APPENDIX H.

Classified abstract of property returns from shore stations for the year ending June 30, 1890.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 1.—Ammunition and explosives.												
Yards and Docks	$4.95	$92.50	$7.50			$104.95	$100.00				$100.00	$4.95
Equipment and Recruiting		48.10	39.14		$7.74	94.98	2.00				2.00	92.98
Navigation	37.14					37.14				$37.14	37.14	
Ordnance	2,292,077.96	107,988.17	198,207.71	$124,597.38	60,703.86	2,783,575.08	78,844.71	$42,867.28	$505.50	397,423.99	519,641.48	2,263,933.60
Construction and Repair			6.00			6.00	6.00				6.00	
Total	2,292,120.05	108,128.77	198,260.35	124,597.38	60,711.60	2,783,818.15	78,952.71	42,867.28	505.50	397,461.13	519,786.62	2,264,031.53
Class 2.—Anchors and anchor gear.												
Yards and Docks	25.50		828.66			854.16						854.16
Equipment and Recruiting	275,847.22	283.65	70,798.41	20,966.86	14,347.17	382,243.31	12,112.30	17,916.11	4,907.44	88,484.88	123,420.73	258,822.58
Navigation	20.00					20.00				20.00	20.00	
Ordnance	905.51				69.10	974.61						974.61
Construction and Repair	34,120.87	2,412.38	2,272.54	477.22	41.00	39,324.01	1,546.24	198.92		3,418.16	5,158.32	34,165.69
Steam Engineering	84.60					84.60						84.60
Total	311,008.70	2,696.03	73,899.61	21,444.08	14,457.27	423,500.69	13,658.54	18,115.03	4,907.44	91,918.04	128,599.05	294,901.64
Class 3.—Electrical apparatus and material.												
Yards and Docks	83.21	88.47				171.68	88.85				88.85	82.83
Equipment and Recruiting	1,788.85	192.80	867.73	246.84	21.50	3,117.72	276.81	874.49		1,164.52	1,815.82	1,301.90
Navigation	6.75	571.45	392.50			970.70	784.56			124.10	908.66	62.04
Ordnance	10,429.61	21,049.23	4,715.67	627.94	3,679.12	40,501.57	4,769.18	1,767.00		20,813.98	27,350.16	13,151.41
Construction and Repair	3,600.93	7,285.50				10,886.43	7,264.25				7.264.25	3,622.18
Steam Engineering	8.25	43.42		146.47		198.14	43.42			146.47	189.89	8.25
Naval Academy	6.49	1,643.03				1,649.52	1,626.77				1,626.77	22.75
Total	15,924.09	30,873.90	5,975.90	1,021.25	3,700.62	57,495.76	14,853.84	2,141.49		22,249.07	39,244.40	18,251.36

Classified abstract of property returns from shore stations for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 4.—Fire apparatus and material.												
Yards and Docks	$1,090.57	$21.30	$175.05	....	....	$1,286.92	$234.01	$28.00	....	$21.54	$283.55	$1,003.37
Equipment and Recruiting	12,005.00	1,306.86	2,626.08	$122.80	$106.36	16,167.10	43.15	1,755.96	....	2,274.27	4,073.38	12,093.72
Navigation	1.60	....	84.45	....	....	86.05	84.45	....	....	1.60	86.05	....
Ordnance	1,908.48	126.00	126.88	....	11.40	2,172.76	256.53	16.65	....	22.68	295.86	1,876.90
Construction and Repair	514.47	66.35	299.20	....	28.00	908.02	67.51	110.38	....	49.36	227.25	680.77
Steam Engineering	1,497.35	39.17	136.06	26.88	33.42	1,732.88	24.60	84.72	....	140.25	249.57	1,483.31
Naval Academy	....	25.15	....	....	....	25.15	25.15	....	....	....	25.15	....
Total	17,017.47	1,584.83	3,447.72	149.68	179.18	22,378.88	735.40	1,995.71	....	2,509.70	5,240.81	17,138.07
Class 5.—Photographic apparatus and material.												
Yards and Docks	....	50.35	....	....	....	50.35	50.35	....	....	....	50.35	....
Equipment and Recruiting	....	49.75	1.50	....	....	51.25	....	....	....	49.75	49.75	1.50
Navigation	1.50	....	....	....	....	1.50	....	....	....	1.50	1.50	....
Ordnance	305.98	276.92	....	....	....	582.90	276.69	....	....	....	276.69	306.21
Construction and Repair	52.51	378.22	....	360.80	....	791.53	685.02	....	....	....	685.02	106.51
Naval Academy	....	326.31	....	....	....	326.31	326.31	....	....	....	326.31	....
Total	359.99	1,081.55	1.50	360.80	....	1,803.84	1,338.37	....	....	51.25	1,389.62	414.22
Class 6.—Small arms and accoutrements.												
Equipment and Recruiting	147.50	....	15.60	....	....	163.10	....	12.60	....	116.00	128.60	34.50
Navigation	3.00	99.90	....	....	....	102.90	99.90	....	....	3.00	102.90	....
Ordnance	210,861.65	90,402.19	87,162.47	1,573.38	14,533.30	404,532.99	8,552.25	21,211.89	....	115,382.62	145,146.76	259,386.23
Construction and Repair	....	....	....	113.19	....	113.19	....	....	....	113.19	113.19	....
Naval Academy	....	188.00	....	....	....	188.00	188.00	....	....	....	188.00	....
Total	211,012.15	90,690.09	87,178.07	1,686.57	14,533.30	405,100.18	8,840.15	21,224.49	....	115,614.81	145,679.45	259,420.73

Class 7.—Articles of canvas.												
Yards and Docks	....	12.50	....	....	....	12.50	12.50	....	....	....	12.50	....
Equipment and Recruiting	59,800.58	1,859.19	123,618.04	108,834.91	16,470.27	310,582.99	11,509.48	87,659.80	8,192.55	141,688.91	249,110.74	61,472.25
Navigation	100.00	....	....	....	....	100.00	....	....	....	100.00	100.00	....
Ordnance	1,387.27	36.00	869.19	1,142.82	163.54	3,596.82	142.45	98.67	....	1,352.96	1,594.08	2,004.74
Construction and Repair	....	....	155.18	....	....	155.18	65.00	....	....	64.74	129.74	25.44
Steam Engineering	....	....	62.67	216.16	....	278.83	30.59	7.50	....	207.75	245.84	32.99
Total	61,287.85	1,907.69	124,705.08	110,193.89	16,633.81	314,728.32	11,820.02	87,765.97	8,192.55	143,414.86	251,192.90	63,535.42
Class 8.—Bags, boxes, and chests.												
Equipment and Recruiting	9,375.18	245.25	8,535.12	14,101.24	181.14	32,437.93	664.22	2,394.73	42.74	17,518.63	20,620.32	11,817.61
Navigation	421.15	....	....	....	....	421.15	....	....	....	421.15	421.15	....
Ordnance	161,599.72	3,980.19	36,841.57	20,952.92	7,018.80	230,393.20	4,607.11	7,568.55	24.09	54,910.43	67,110.18	163,283.02
Construction and Repair	2,744.00	28.80	4,552.05	4,127.93	282.82	11,735.60	288.18	2,215.52	40.00	6,184.40	8,728.10	3,007.50
Steam Engineering	21.34	2.65	201.64	85.88	41.25	352.76	6.08	196.06	....	103.59	305.73	47.03
Provisions and Clothing	....	702.50	....	....	....	702.50	702.50	....	....	....	702.50	....
Total	174,161.39	4,959.39	50,130.38	39,267.97	7,524.01	276,043.14	6,268.09	12,374.86	106.83	79,138.20	97,887.96	178,156.16
Class 9.—Blocks, etc.												
Yards and Docks	1,325.55	19.29	....	....	....	1,344.84	.15	....	....	....	.15	1,344.69
Equipment and Recruiting	260.13	....	17.18	....	28.00	305.31	9.20	12.25	....	14.00	35.45	269.86
Navigation	10.00	31.72	....	....	....	41.72	31.72	....	....	10.00	41.72	....
Ordnance	54,206.01	143.82	1,067.23	847.92	664.38	56,929.36	1,531.32	123.91	....	6,138.09	7,793.32	49,136.04
Construction and Repair	17,149.94	54.96	14,734.91	13,683.28	274.87	45,897.96	2,462.57	1,523.64	....	20,059.80	24,046.01	21,851.95
Steam Engineering	1,066.62	79.94	276.93	9.74	131.25	1,554.48	79.74	173.24	....	254.47	507.45	1,047.03
Naval Academy	....	149.30	....	....	....	149.30	148.15	....	....	....	148.15	1.15
Total	74,008.25	479.03	16,096.25	14,540.94	1,008.50	100,222.97	4,262.85	1,833.04	....	26,476.36	32,572.25	73,650.72
Class 10.—Bolts.												
Yards and Docks	1,081.31	401.60	27.00	....	....	1,508.91	512.31	....	....	24.27	536.58	972.33
Equipment and Recruiting	3.72	7.68	9.58	4.30	....	25.28	8.69	....	....	8.78	17.47	7.81
Navigation	4.27	55.26	....	....	....	59.53	55.26	....	....	4.27	59.53	....
Ordnance	1,632.05	684.71	185.74	26.60	.10	2,729.20	539.71	1.98	....	56.90	598.59	2,130.61
Construction and Repair	4,192.66	3,616.87	125.72	232.05	61.99	8,229.29	2,470.23	24.13	....	425.70	2,920.06	5,309.23
Steam Engineering	14,376.36	293.22	1,511.59	1,009.15	627.91	17,818.23	8.08	458.88	....	1,868.24	3,559.96	14,258.27
Provisions and Clothing	....	.60	....	....	....	.60	.60	....	....	....	.60	....
Naval Academy	23.57	39.46	....	....	....	63.03	21.52	....	....	....	21.52	41.51
Total	21,313.94	5,299.40	1,859.63	1,272.10	690.00	30,434.07	3,616.40	484.49	....	2,388.16	7,714.31	22,719.76

Classified abstract of property returns from shore stations for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 11.—*Brushes and brooms.*												
Yards and Docks	$754.32	$341.67	$80.37	....	....	$1,176.36	$579.61	$1.23	....	$40.61	$621.45	$554.91
Equipment and Recruiting	1,591.85	1,696.78	629.27	....	$134.41	4,052.31	307.19	193.07	$2.52	2,408.04	2,910.82	1,141.49
Navigation	1.25	59.40	22.40	....	.66	83.71	78.30	....	....	3.21	81.51	2.20
Ordnance	2,635.91	761.44	81.64	....	....	3,478.99	2,047.20	34.08	....	207.19	2,288.47	1,190.52
Construction and Repair	1,694.67	1,853.29	359.20	....	12.83	3,920.09	1,387.93	123.81	....	1,391.70	2,903.44	1,016.65
Steam Engineering	4,851.14	352.51	691.48	....	82.49	5,783.05	510.46	177.06	....	1,421.84	2,109.36	3,674.29
Provisions and Clothing	....	62.60	....	....	....	62.60	62.60	....	....	....	62.60	....
Naval Academy	151.30	393.28	....	....	....	544.58	334.87	....	....	....	334.87	209.71
Total	11,683.44	5,521.00	1,867.36	....	230.39	19,102.29	5,308.16	529.25	2.52	5,472.59	11,312.52	7,789.77
Class 12.—*Buckets, hods, and shovels.*												
Yards and Docks	551.66	182.14	107.20	....	....	841.00	492.02	....	....	8.83	500.85	340.15
Equipment and Recruiting	1,803.16	222.20	477.75	....	16.00	2,519.11	40.26	47.33	1.20	1,527.24	1,616.03	903.08
Navigation	.33	4.50	14.28	....	....	19.11	18.78	....	....	.33	19.11	....
Ordnance	3,813.30	123.99	2,495.98	$766.71	259.06	7,959.04	113.98	500.54	....	2,767.48	3,442.00	4,517.01
Construction and Repair	1,279.74	36.38	963.34	2,550.90	....	4,830.36	364.97	100.81	99.00	2,631.11	3,195.39	1,634.97
Steam Engineering	2,483.19	257.30	764.87	582.95	64.12	4,152.43	165.56	482.19	.70	1,317.08	1,965.53	2,186.90
Provisions and Clothing	....	9.75	....	....	....	9.75	9.75	....	....	....	9.75	....
Naval Academy	55.02	94.58	....	....	....	149.60	126.50	....	....	....	126.50	23.10
Total	9,486.40	911.34	5,823.42	3,900.56	339.18	20,480.40	1,331.82	1,190.37	100.90	8,252.07	10,875.16	9,605.24
Class 13.—*Building material.*												
Yards and Docks	87,709.18	24,958.28	98.22	....	91.16	112,856.84	27,378.69	....	....	1,285.64	28,664.33	84,192.51
Equipment and Recruiting	250.65	677.06	282.09	....	61.98	1,271.78	557.30	67.85	....	383.24	1,008.39	263.39
Navigation	7.11	415.54	15.00	....	....	437.65	425.54	....	....	7.11	432.65	5.00
Ordnance	16,993.70	17,505.29	71.87	....	....	34,570.86	19,386.18	....	....	183.60	19,569.78	15,000.53
Construction and Repair	2,790.46	3,798.71	1,173.08	28.68	....	7,790.93	3,697.38	7.32	....	209.30	3,914.00	3,876.08

Steam Engineering	4,770.12	3,522.48	108.58		20.88	8,722.06	3,143.07	47.46		748.49	3,939.02	4,783.04
Provisions and Clothing		5.00				5.00	5.00				5.00	
Naval Academy	38.17	4,081.52				4,119.69	4,081.02				4,081.02	38.67
Total	112,550.39	54,963.88	2,048.31	28.68	174.02	169,774.31	58,674.18	122.63		2,817.88	61,614.19	108,160.12
Class 14.—Canvas.												
Yards and Docks	678.20		68.40			746.60	104.45				104.45	642.15
Equipment and Recruiting	160,492.29	23,542.37		2,564.06	19,512.10	221,978.07	45,996.46	28,708.79		27,505.52	97,210.77	124,767.30
Navigation	62.92		.79		2.47	66.18				66.18	66.18	
Ordnance	2,519.16	1,273.51	258.95	31.00		4,082.62	1,150.13			197.48	1,347.61	2,735.01
Construction and Repair	181.41	250.88	923.84			1,356.13	1,028.67			74.75	1,103.42	252.71
Steam Engineering	340.31	142.13	493.16			975.60	432.57	1.00		263.84	697.41	278.19
Naval Academy		46.75				46.75	46.75				46.75	
Total	164,274.20	25,255.64	1,745.14	2,595.06	19,514.57	229,251.95	48,769.03	23,709.79		28,107.77	100,576.59	128,675.36
Class 15.—Chain, and articles of chain.												
Yards and Docks	88.19		801.00			889.19	53.10			1.15	54.25	834.94
Equipment and Recruiting	499,102.28	515.92	100,896.99	44,380.22	21,903.60	666,799.01	21,291.08	82,346.98	21,190.14	120,918.48	195,746.68	471,052.33
Navigation	2.40	1.92	1.46			5.78	3.38			2.40	5.78	
Ordnance	681.06	78.73				759.79	40.98	32.47		.72	74.17	685.62
Construction and Repair	2,446.93	110.15	82.04			2,639.12	179.61			2.00	181.61	2,457.51
Steam Engineering	1,559.53	11.50	21.82		77.50	1,670.35	83.56	19.66		76.03	179.25	1,491.10
Naval Academy	.64	4.29				4.93	4.34				4.34	.59
Total	503,881.03	722.51	101,803.31	44,380.22	21,981.10	672,768.17	21,656.05	82,390.11	21,190.14	121,000.78	196,246.08	476,522.09
Class 16.—Clothing.												
Equipment and Recruiting	80.81	130.50	363.45	144.96	50.00	769.72	78.38	387.05		288.55	753.98	15.74
Navigation	12.96	44.25				57.21	44.25			12.96	57.21	
Ordnance	19.50		4.54			24.04	3.25				3.25	20.79
Construction and Repair	63.17	86.38				149.55	25.85			67.00	92.85	56.70
Steam Engineering			13.20			13.20	13.20				13.20	
Provisions and Clothing	358,617.83	246,419.40	227,389.37	132,577.98	2,588.67	967,593.25	156.13	89,350.66	113,636.51	417,705.26	570,848.56	396,744.60
Total	358,794.27	246,680.53	227,770.56	132,722.94	2,638.67	968,606.97	321.06	89,737.71	113,636.51	418,073.77	571,769.05	396,837.92
Class 17.—Cocks, gauges, valves, etc.												
Yards and Docks	3,850.71	283.27	40.35			4,174.33	545.45			58.09	603.54	3,570.79
Equipment and Recruiting	1,640.87	192.67	529.50	60.88	113.83	2,537.75	285.78	428.43	23.33	502.17	1,239.71	1,298.04
Navigation		98.56	80.99			179.55	179.55				179.55	

Classified abstract of property returns from shore stations for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 17.—*Cocks, gauges, valves, etc.*—Continued.												
Ordnance	$746.89	$1,778.29	$145.11		$2.63	$2,972.92	$521.63			$25.49	$547.12	$2,425.80
Construction and Repair	10,157.60	2,984.45	392.70	$10.00	87.63	13,632.38	3,587.17	$70.09		271.55	3,928.81	9,703.57
Steam Engineering	67,086.80	4,600.27	6,332.38	609.96	1,125.00	79,754.41	6,811.02	3,470.87		4,969.69	15,251.58	64,502.83
Provisions and Clothing		13.40				13.40	13.40				13.40	
Naval Academy	238.36	358.76				597.12	207.51				207.51	389.61
Total	83,721.23	10,309.67	7,821.03	680.84	1,320.09	103,801.86	12,151.51	3,969.39	$23.33	5,826.99	21,971.22	81,890.64
Class 18.—*Cordage, cables, hawsers, and miscellaneous rigging.*												
Yards and Docks	896.45	1,323.60	2,363.58			4,583.63	3,855.41			99.00	3,954.41	629.22
Equipment and Recruiting	254,899.02	7,263.39	243,371.68	150,934.76	48,158.42	704,627.27	66,019.50	156,696.94	9,867.42	253,417.92	486,001.78	218,625.49
Navigation	2,291.46	4.50	62.26		61.05	2,419.27	4.50	2.01		2,412.76	2,419.27	
Ordnance	25,036.18	2,749.04	10,286.22	3.51	864.30	38,939.25	5,481.72	130.84		8,583.67	14,199.23	24,740.02
Construction and Repair	6,821.01	1,110.77	3,168.55			10,600.33	3,958.48			1,012.58	4,971.06	5,629.27
Steam Engineering	2,813.73	122.86	843.34	13.08	31.00	3,824.01	859.49	34.17		380.42	1,274.08	2,549.93
Naval Academy	13.62	86.42	159.50			259.54	217.54				217.54	42.00
Total	292,271.47	12,660.58	260,255.13	150,951.35	49,114.77	765,253.30	80,390.64	156,863.96	9,867.42	265,906.35	513,037.37	252,215.93
Class 19.—*Dry goods.*												
Yards and Docks	10,732.49	6,534.19	261.72			17,528.40	4,995.09	4,457.87		42.26	9,495.22	8,033.18
Equipment and Recruiting	12,167.92	16,076.31	17,046.91	4,566.67	1,442.93	51,300.74	9,089.92	12,457.38	122.68	18,817.45	40,487.43	10,813.31
Navigation	4,201.01	120.99	75.86		11.36	4,409.22	93.98	1.09		4,314.15	4,409.22	
Ordnance	45,292.57	4,756.60	1,470.12	317.54	522.62	52,359.45	12,529.15	557.05		2,285.46	15,371.66	36,987.79
Construction and Repair	3,602.04	2,007.41	678.01	48.38	45.41	6,376.25	1,653.78	225.29	44.24	620.80	2,544.11	3,832.14
Steam Engineering	661.40	370.54	78.99		10.28	1,121.21	58.04	82.49		450.83	591.36	529.85
Provisions and Clothing		1,399.60				1,399.60	1,389.60			10.00	1,399.60	
Naval Academy	83.99	1,301.72				1,385.71	1,223.33				1,223.33	162.38
Total	76,741.42	32,567.36	19,606.61	4,932.59	2,032.60	135,880.58	31,032.80	17,781.17	166.92	26,540.96	75,521.98	60,358.65

Class 20.—Fuel.												
Yards and Docks	2,267,10	21,482.36	40.74	....	6.82	23,797 02	19,896.61	.02	....	79.62	19,976.25	3,820.77
Equipment and Recruiting	36,927.62	183,575.37	4,778.61	212.22	4,065.57	229,559.39	43,387.82	6,246.07	2,008.30	114,325.29	165,967.48	63,501.91
Navigation	57.80	45.13	224.00	....	....	326.93	269.13	....	....	57.80	326.93	....
Ordnance	12,185.99	29,511.19	51.56	....	....	41,748.74	22,808.17	....	....	1,199.29	24,007.46	17,741.28
Construction and Repair	35,975.03	44,966.32	1,768.32	....	....	82,709.67	68,626.06	....	....	448.66	69,074.72	13,634.95
Steam Engineering	18,057.27	34,600.83	840.26	....	....	52,998.36	33,182.27	1.50	....	820.34	34,004.11	18,994.25
Provisions and Clothing	346.70	2,788.68	....	....	....	3,135.38	2,866.16	....	....	....	2,866.16	269.22
Naval Academy	1,493.24	14,819.13	....	....	....	16,312.37	14,929.67	....	....	527.37	15,457.04	855.33
Total	107,310.75	331,789.01	7,203.49	212.22	4,072.39	450,587.86	205,965.89	6,247.59	2,008.30	117,458.37	331,680.15	118,907.71
Class 21.—Furniture and fittings, galley, kitchen, house, and table.												
Yards and Docks	19,332.22	3,043.68	7.17	28.09	40.00	22,451.16	1,628.59	3,167.69	....	....	4,796.28	17,634.88
Equipment and Recruiting	26,356.63	9,790.02	19,173.84	6,142.85	3,846.72	65,310.06	1,376.19	12,222.01	71.73	24,532.92	38,202.85	27,107.21
Navigation	....	565.79	1,413.50	....	....	1,979.29	1,979.29	....	....	....	1,979.29	....
Ordnance	3,763.70	2,057.18	46.61	....	....	5,867.49	1,989.61	46.00	....	71.01	2,106.62	3,760.87
Construction and Repair	7,233.09	5,397.91	20,087.49	12,441.68	967.25	46,127.42	4,026.36	5,571.40	1,251.50	16,798.78	27,648.03	18,479.39
Steam Engineering	393.64	157.91	20.82	....	.66	373.03	161.21	.66	....	38.38	200.25	172.78
Provisions and Clothing	13.89	570.82	15.57	....	....	600.28	533.29	....	....	53.10	586.39	13.89
Naval Academy	122.84	3,690.10	....	....	....	3,812.94	3,725.77	....	....	....	3,725.77	87.17
Total	57,016.01	25,278.41	40,765.00	18,612.62	4,854.63	146,521.67	15,420.30	21,007.76	1,323.23	41,494.19	79,245.48	67,276.19
Class 22.—Glass.												
Yards and Docks	1,621.38	526.99	24.74	....	....	2,173.11	1,064.67	4.01	....	14.54	1,083.22	1,089.89
Equipment and Recruiting	7.00	9.16	94.41	....	....	110.57	15.40	....	....	26.00	41.40	69.17
Navigation	87.97	58.50	....	....	....	146.47	51.19	....	....	87.97	139.16	7.31
Ordnance	150.00	556.65	1.72	....	1.25	709.62	425.88	....	....	.96	426.84	282.78
Construction and Repair	1,361.19	822.48	133.42	....	.52	2,317.61	570.39	15.62	....	606.49	1,192.50	1,125.11
Steam Engineering	280.64	94.94	54.29	....	3.22	433.09	92.96	13.86	....	80.66	187.48	245.61
Naval Academy	77.19	109.65	....	....	....	186.84	81.45	....	....	....	81.45	105.39
Total	3,585.37	2,178.37	308.58	....	4.99	6,077.31	2,301.94	33.49	....	816.62	3,152.05	2,925.26
Class 23.—Guns and carriages.												
Yards and Docks	....	....	5,792.00	....	....	5,792.00	5,792.00	....	....	....	5,792.00	....
Ordnance	4,624,047.23	8,424.40	1,298,135.58	447,558.71	284,525.70	6,662,691.62	116,686.74	284,920.25	712.60	1,607,828.92	2,100,148.51	4,562,543.11
Total	4,624,047.23	8,424.40	1,303,927.58	447,558.71	284,525.70	6,668,483.62	122,478.74	284,920.25	712.60	1,697,828.92	2,105,940.51	4,562,543.11

Classified abstract of property returns from shore stations for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 24.—Gun equipments and implements.												
Equipment and Recruiting	$305.11			$30.00		$335.11		$305.11		$30.00	$335.11	
Ordnance	801,789.72	$11,370.91	$240,654.27	182,349.83	$20,668.54	1,256,843.27	$19,432.98	30,569.20	$329.81	361,170.50	411,501.99	$845,341.28
Construction and Repair	106.52		1,027.72		847.80	1,982.04	81.29			773.88	855.17	1,126.87
Steam Engineering	12.90	.75		33.64		47.29				35.64	35.64	11.65
Total	802,214.25	11,371.66	241,691.99	182,413.47	21,516.34	1,259,207.71	19,514.27	30,874.31	329.31	362,010.02	412,727.91	846,479.80
Class 25.—Hardware.												
Yards and Docks	3,641.53	397.46	31.51			4,070.50	846.98			72.65	919.63	3,150.87
Equipment and Recruiting	983.02	446.30	361.78	39.81	13.85	1,844.76	194.96	66.16	9.00	787.41	1,067.53	787.23
Navigation	209.46	308.28	216.17			733.91	515.51			209.46	724.97	8.94
Ordnance	7,709.70	535.91	890.19	6.58	3.72	9,146.10	543.91	168.24		975.93	1,688.08	7,458.02
Construction and Repair	29,907.20	2,205.03	779.89	322.23	22.04	33,236.39	2,883.04	116.38		1,548.34	4,547.76	28,688.63
Steam Engineering	3,183.32	163.72	180.20	54.17	10.03	3,591.44	337.92	48.04		192.33	578.29	3,013.15
Provisions and Clothing		6.45	2.52			8.97	8.97				8.97	
Naval Academy	141.07	601.95				743.02	499.06				499.06	243.96
Total	45,775.30	4,665.10	2,462.26	422.79	49.64	53,375.09	5,830.35	398.82	9.00	3,786.12	10,024.29	43,350.80
Class 26.—Hose.												
Yards and Docks	2,210.48	705.20	205.40			3,211.08	1,741.83	117.90		41.00	1,900.73	1,310.35
Equipment and Recruiting	9,315.02	5,477.20	7,212.96	10.20	525.50	22,540.88	333.03	4,049.02	265.98	8,845.83	13,493.86	9,047.02
Navigation	17.50		115.00			132.50	115.00			17.50	132.50	
Ordnance	1,901.49	647.91	331.03	7.34	94.72	2,962.48	530.77	156.70		252.15	939.02	2,042.86
Construction and Repair	1,091.52	187.20	77.92			1,356.64	846.88			15.40	862.28	494.36
Steam Engineering	7,558.85	1,701.46	2,630.55	58.23	210.19	12,159.28	644.04	2,583.80		2,795.14	6,023.07	6,136.21
Naval Academy	27.50	82.40				199.90	61.90				61.90	48.00
Total	22,122.36	8,801.37	10,662.85	75.77	830.41	42,492.76	4,273.45	6,907.51	265.98	11,967.02	23,418.96	19,078.80
Class 27.—Incidentals.												
Yards and Docks		18,226.94				18,226.94	18,226.94				18,226.94	
Equipment and Recruiting		4,832.23			10.00	4,842.35	4,767.36	48.86	26.13		4,842.35	

Navigation		2.35				2.35	2.35				2.35	
Ordnance	2,713.67	2,388.54				5,102.21	5,102.21				5,102.21	
Construction and Repair	6.00	3,507.63				3,513.63	3,513.63				3,513.63	
Steam Engineering		381.51		400.20		781.71	366.43			415.28	781.71	
Provisions and Clothing		2,966.28				2,966.28	2,966.28				2,966.28	
Naval Academy		11,816.77				11,816.77	11,816.77				11,816.77	
Total	2,719.67	44,122.37		400.20	10.00	47,252.24	46,761.97	48.86	28.13	415.28	47,252.24	
Class 28 — Navigation instruments and apparatus.												
Yards and Docks		25.50				25.50	9.50				9.50	16.00
Equipment and Recruiting	397.52	980.97	3,843.17		82.19	5,303.85	13.01	136.11	57.50	4,488.32	4,694.94	608.91
Navigation	1,061.78	287.40	316.47			1,665.65	526.67			1,072.78	1,599.45	66.20
Ordnance	15,416.61	411.87	432.46		20.95	16,281.89	910.48	22.85		947.89	1,881.22	14,400.67
Construction and Repair	79.00	5.50				84.50	5.50				5.50	79.00
Steam Engineering	349.14	154.67	4.70		2.00	510.51	218.06	2.50		10.60	231.16	279.35
Provisions and Clothing		16.50				16.50	16.50				16.50	
Naval Academy		1,860.89	25.00			1,885.89	1,883.49				1,883.49	2.40
Total	17,304.05	3,743.30	4,621.80		105.14	25,774.29	3,583.21	161.46	57.50	6,519.59	10,321.76	15,452.53
Class 29.—Musical instruments and apparatus.												
Equipment and Recruiting	125.95	61.45	249.63			437.03	49.39			345.16	394.55	42.48
Navigation	245.13		66.21			311.34	18.00			245.13	263.13	48.21
Construction and Repair	22.50			12.84		35.34				12.84	12.84	22.50
Naval Academy	42.32	36.55				78.87	75.54				75.54	3.33
Total	435.90	98.00	315.84	12.84		862.58	142.93			603.13	746.06	116.52
Class 30.—Miscellaneous instruments and apparatus.												
Yards and Docks	3,353.33	1,205.65	1.50			4,560.48	1,431.40	1.00			1,432.40	3,128.08
Equipment and Recruiting	1,494.21	196.30	628.48		3.40	2,322.39	180.22	323.45		737.80	1,241.47	1,080.92
Navigation	301.53	20.39	136.60		5.00	463.52	144.04			319.48	463.52	
Ordnance	1,637.92	753.72	186.12		155.27	2,730.03	691.92	177.69		99.75	969.36	1,763.67
Construction and Repair	1,558.18	2,055.09	52.40	281.80	4.50	3,951.97	2,338.50	5.75		32.19	2,376.44	1,875.53
Steam Engineering	20,304.98	966.21	1,901.74	30.99	1,147.88	24,351.80	1,599.03	2,087.52		1,708.71	5,395.26	18,956.54
Provisions and Clothing		34.85	22			35.07	35.07				35.07	
Naval Academy		685.06				685.06	676.06				676.06	9.00
Total	28,650.15	5,917.27	2,907.06	312.79	1,316.05	39,103.32	7,096.24	2,595.41		2,897.93	12,589.58	26,513.74

Classified abstract of property returns, from shore stations, for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balances on hand June 30, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 31.—Lamps; lamp fixtures.												
Yards and Docks	$318.16	$201.29	$18.84	....	....	$538.29	$235.09	$6.54	....	$2.65	$244.28	$294.01
Equipment and Recruiting	1,568.24	3,543.96	13,049.64	$189.84	$347.45	18,699.13	294.02	3,262.34	....	7,341.72	10,898.08	7,801.05
Navigation	7,457.76	102.07	916.71	....	233.53	8,710.07	31.60	435.01	$167.86	8,040.60	8,675.07	35.00
Ordnance	5,174.07	218.44	1,082.98	325.21	296.98	7,097.68	273.39	333.03	....	1,706.76	2,313.18	4,784.50
Construction and Repair	390.24	147.38	6.30	....	.75	544.67	152.61	....	....	13.74	166.85	378.82
Steam Engineering	4,610.46	1,817.04	2,074.73	348.20	238.40	9,088.83	377.09	1,435.94	....	2,946.27	4,759.30	4,329.53
Provisions and Clothing	....	14.17	....	....	....	14.17	6.22	....	....	7.95	14.17	....
Naval Academy	60.30	53.85	....	....	....	114.15	64.42	....	....	....	64.42	49.73
Total	19,579.23	6,098.20	17,149.20	863.25	1,117.11	44,806.99	1,434.44	5,472.86	167.86	20,050.69	26,134.85	17,672.14
Class 32.—Leather and belting.												
Yards and Docks	3,594.23	155.24	14.79	....	....	3,764.26	588.25	....	....	83.85	672.10	3,092.16
Equipment and Recruiting	5,283.10	639.69	586.36	....	15.37	6,524.52	1,484.96	34.19	....	1,383.16	2,902.31	3,622.21
Navigation	6.48	8.00	63.18	....	....	77.66	39.59	....	....	6.48	46.07	31.59
Ordnance	6,338.15	3,016.43	190.29	11.37	1.80	9,558.04	5,425.05	9.85	....	114.43	5,549.33	4,003.71
Construction and Repair	10,457.85	3,605.57	532.33	....	....	14,595.75	5,769.05	....	....	183.65	5,902.70	8,693.05
Steam Engineering	21,452.35	374.04	80.66	....	5.38	21,912.43	6,605.33	31.38	....	685.40	7,322.11	14,590.82
Provisions and Clothing	....	13.37	100.20	....	....	113.57	113.57	....	....	....	113.57	....
Naval Academy	29.50	28.57	....	....	....	58.07	20.75	....	....	....	20.75	37.32
Total	47,156.66	7,840.91	1,567.81	11.37	23.55	56,599.30	20,046.55	75.42	....	2,406.97	22,528.94	34,070.36
Class 33.—Lumber and timber: Ash and poplar.												
Yards and Docks	1,109.40	137.50	....	....	....	1,246.90	155.93	....	....	248.95	404.88	842.02
Equipment and Recruiting	78.06	....	6.25	....	....	84.31	21.13	....	....	63.18	84.31	....
Navigation	....	10.80	3.51	....	....	14.31	14.31	....	....	....	14.31	....
Ordnance	3,300.19	2,586.77	287.48	....	....	6,174.44	1,288.00	....	....	....	1,288.00	4,886.44
Construction and Repair	11,484.92	7,355.76	167.78	218.79	161.97	19,389.22	4,399.73	161.97	....	733.21	5,294.91	14,094.31

Steam Engineering	443.23	7.00	16.41	....	....	466.64	177.48	....	....	.70	178.18	288.46
Naval Academy	....	33.90	....	....	....	33.90	33.90	....	....	....	33.90	....
Total	16,415.80	10,131.73	481.43	218.79	161.97	27,409.72	6,090.48	161.97	....	1,046.04	7,298.49	20,111.23
Class 34.—Lumber and timber: Oak.											
Yards and Docks	1,223.46	653.58	2,055.12	....	....	3,932.16	2,779.17	....	....	15.94	2,795.11	1,137.05
Navigation	....	109.40	....	....	....	109.40	109.40	....	....	....	109.40	....
Ordnance	31,631.89	2,461.85	3,422.49	....	....	37,516.23	4,173.36	....	....	2,539.62	6,712.98	30,803.25
Construction and Repair	1,688,630.28	7,739.36	84.52	76.77	....	1,696,530.93	27,808.19	13.00	....	2,582.18	30,403.37	1,666,127.56
Steam Engineering	....	9.84	171.00	....	....	180.84	180.84	....	....	....	180.84	....
Naval Academy	....	62.94	....	....	....	62.94	62.94	....	....	....	62.94	....
Total	1,721,485.63	11,036.97	5,733.13	76.77	....	1,738,332.50	35,113.90	13.00	....	5,137.74	40,264.64	1,698,067.86
Class 35.—Lumber and timber: White pine.											
Yards and Docks	3,005.49	2,810.74	200.87	....	....	6,017.10	3,606.98	....	....	19.38	3,626.36	2,390.74
Equipment and Recruiting	131.20	409.67	111.41	....	....	652.28	408.94	....	....	95.31	504.25	148.03
Navigation	....	472.20	81.81	....	....	554.01	554.01	....	....	....	554.01	....
Ordnance	15,305.73	20,718.30	166.62	427.14	76.73	36,694.52	11,920.98	....	....	272.29	12,193.27	24,501.25
Construction and Repair	27,049.05	22,643.18	734.20	898.69	20.92	51,346.04	21,005.12	....	....	3,224.49	24,229.61	27,116.43
Steam Engineering	5,975.08	3,721.00	186.00	....	....	9,882.08	2,913.80	....	....	23.00	2,936.80	6,945.28
Provisions and Clothing	....	381.98	....	....	....	381.98	381.98	....	....	....	381.98	....
Naval Academy	....	898.49	....	....	....	898.49	894.49	....	....	....	894.49	4.00
Total	51,466.55	52,055.56	1,480.91	1,325.83	97.65	106,426.50	41,686.30	....	....	3,634.47	45,320.77	61,105.73
Class 36.—Lumber and timber, yellow pine.											
Yards and Docks	10,686.20	31,998.84	36.84	....	698.39	43,420.27	37,529.61	2,680.24	....	1,672.77	41,882.62	1,537.65
Navigation	....	1,089.74	....	....	....	1,089.74	1,089.74	....	....	....	1,089.74	....
Ordnance	19,454.29	7,366.83	195.49	....	....	27,016.61	7,179.10	....	....	15.67	7,194.77	19,821.84
Construction and Repair	27,048.05	28,932.80	8,358.36	118.66	620.94	65,078.81	16,985.04	1,269.25	....	7,824.40	26,078.69	39,000.12
Steam Engineering	45.48	373.02	19.82	....	....	438.32	281.98	....	....	96.11	378.09	60.23
Naval Academy	....	1,482.62	....	....	....	1,482.62	1,482.62	....	....	....	1,482.62	....
Total	57,234.02	71,243.85	8,610.51	118.66	1,319.33	138,526.37	64,548.09	3,949.49	....	9,608.05	78,106.53	60,419.84
Class 37.—Lumber and timber, miscellaneous.											
Yards and Docks	6,533.49	5,813.60	382.17	....	....	12,729.26	6,884.03	....	....	11.80	6,895.83	5,833.43
Equipment and Recruiting	46.38	....	111.76	....	....	158.14	82.64	....	....	37.50	120.14	38.00

Classified abstract of property returns, from shore stations, for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
CLASS 37.—*Lumber and timber, miscellaneous*—Cont'd.												
Navigation		$1,813.84	$37.50			$1,851.34	$1,851.34				$1,851.34	
Ordnance	$24,728.37	11,117.31	273.25			36,118.93	3,025.93	$7,773.85		$37.92	10,837.70	$25 281.23
Construction and Repair	80,506.16	40,850.70	1,087.04	$221.48	$62.15	122,757.53	27,005.93	644.74		2,856.22	30,506.89	92 250.64
Steam Engineering	11,926.28	347.20	81.80	26.26	63.00	12,444.54	1,162.04			184.40	1,346.44	11 098.10
Naval Academy		653.77				653.77	653.77				653.77	
Total	123,740.68	60,626.42	1,973.52	247.74	125.15	186,713.51	40,665.68	8,418.59		3,127.84	52,212.11	134,501.40
Class 38.—Machinery and machine tools.												
Yards and Docks	20,369.71	5,686.48	173.47			26,229.06	21,310.67				21,310.67	4,918.99
Equipment and Recruiting	8,666.09	199.05	2,088.08	759.57	929.68	12,042 47	1,889.48	1,802.78		2,138.89	5,831.15	6,811.32
Navigation			644.75			644.75	644.75				644.75	
Ordnance	121,204.68	134,065.12	2,180.39	43.32	1,631.35	259,124.86	6,190.95	104.73		1,704.02	8,008.70	251,116.16
Construction and Repair	144,523.09	183,880.29	2,008.42	239.96	393.60	331,045.36	43,580.90	535.67		2,071.56	46,188.13	284,857.23
Steam Engineering	170,445.36	101,485.70	91,828.70	45,470.34	9,549.39	418,779.49	57,583.75	4,764.17	$3,849.75	119,004.79	185,202.46	233,577.03
Provisions and Clothing		20.00				20.00	20.00				20.00	
Naval Academy	8.32	2,735.19				2,743.51	2,724.13				2,724.18	19.38
Total	465,217.25	428,071.83	98,923.81	46,513.10	12,504.02	1,051,230.10	133,953.63	7,207.35	3,849.75	124,919.26	269,929.99	781,300.11
Class 39.—Metals: Brass, copper, lead, tin, zinc, etc.												
Yards and Docks	6,432.57	473.76	261.33			7,167.66	2,093.19			69.65	2,102.84	5,004.82
Equipment and Recruiting	3,032.87	420.52	821.52	22.54		4,296.95	778.40	1.20		151.60	931.20	3,365.75
Navigation	489.90	121.58	42.04			653.52	178 87			479.65	653.52	
Ordnance	58,297.18	3,994.86	37,260.33	2,716.74	19,773.46	122,051.52	34,242.02			33,222.23	67,464.25	54,587.27
Construction and Repair	398,060.37	5,876.65	22,966.75	24,529.42	18,658.22	470,091.41	48,141.57	22,702.95		57,430.49	128,284.01	341,807.40
Steam Engineering	74,624.06	10,703.51	3,900.84	392.68	1,462.85	91,083.94	14,473.95	906.19		5,370.78	20,750.92	70,333.02
Naval Academy	134.29	387.65				521.94	363.97				363.97	157.97
Total	541,070.69	21,978.53	65,261,81	27,661.38	39,894.53	695,866 94	100,266.97	23,610.34		96,733.40	220,610.7[illegible]	475,250.23

Class 40.—Metals: Iron, bar.												
Yards and Docks	9,188.81	1,086.66	318.91	....	....	10,596.38	1,894.27	....	....	253.14	2,147.41	8,448.97
Equipment and Recruiting	2,923.22	....	517.59	....	....	3,460.81	554.41	491.79	....	53.04	1,099.24	2,361.57
Navigation	.21	50.06	25.48	....	....	75.75	75.54	....	....	.21	75.75	....
Ordnance	8,949.09	2,329.10	4,048.91	2.20	423.80	15,753.26	4,114.17	34.36	....	4,083.19	8,251.72	7,501.54
Construction and Repair	194,836.71	2,148.70	9,661.51	....	12,452.90	219,099.82	10,785.05	17,771.88	....	9,607.67	38,164.60	180,935.22
Steam Engineering	75,435.35	1,790.50	562.19	9.72	95.77	77,893.53	4,600.04	132.93	....	1,736.29	6,469.26	71,424.27
Naval Academy	55.39	220.81	....	....	....	276.20	142.60	....	....	....	142.60	133.60
Total	291,388.78	7,627.93	15,154.59	11.92	12,972.53	327,155.75	22,186.08	18,430.96	....	15,733.54	56,310.58	270,805.17
Class 41.—Metals: Iron, sheet.												
Yards and Docks	2,206.01	43.59	50.28	....	....	2,299.88	517.11	....	....	96.28	613.39	1,686.49
Equipment and Recruiting	91.81	227.34	170.63	....	....	489.78	397.97	....	....	....	397.97	91.81
Ordnance	940.17	249.45	69.64	....	28.54	1,287.80	391.18	....	....	12.45	403.63	884.17
Construction and Repair	30,267.43	3,905.35	126.40	....	513.08	34,812.26	5,339.06	500.99	....	335.57	6,175.62	28,636.64
Steam Engineering	33,134.51	2,467.24	905.19	....	266.54	36,773.48	5,456.20	68.98	....	1,770.23	7,295.41	29,478.07
Naval Academy	37.34	50.13	....	....	....	87.47	54.99	....	....	....	54.99	32.48
Total	66,677.27	6,913.10	1,322.14	....	808.16	75,750.67	12,156.51	569.97	....	2,214.53	14,941.01	60,809.66
Class 42.—Metals: Iron, miscellaneous.												
Yards and Docks	9,563.43	8,989.74	224.92	....	....	18,778.09	8,424.42	....	....	56.25	8,480.67	10,297.42
Equipment and Recruiting	1,079.68	77.14	23.40	....	....	1,180.22	100.54	....	....	2.15	102.69	1,077.53
Ordnance	15,879.46	22,071.34	5,066.66	....	....	43,017.46	15,649.43	718.78	....	2,618.20	18,986.41	24,031.05
Construction and Repair	31,245.42	2,913.87	1,113.53	....	....	35,272.82	4,265.24	2.00	....	3,269.84	7,537.08	27,735.74
Steam Engineering	49,078.90	4,903.76	1,322.05	1,276.15	2,194.96	58,775.82	6,924.89	8.96	....	2,670.53	9,604.38	49,171.44
Naval Academy	88.94	280.33	....	....	....	369.27	369.27	....	....	....	369.27	....
Total	106,935.83	39,236.18	7,750.56	1,276.15	2,194.96	157,393.68	35,733.79	729.74	....	8,616.97	45,080.50	112,313.18
Class 43.—Metals: Steel, bar.												
Yards and Docks	8,091.27	355.32	12.72	....	....	8,459.31	600.99	....	....	64.12	665.11	7,794.20
Equipment and Recruiting	557.66	8,048.00	124.34	....	....	8,730.00	8,242.45	....	....	....	8,242.45	487.55
Ordnance	11,917.97	15,780.09	1,489.56	2,874.95	10.39	32,072.96	14,934.53	72.04	....	801.74	15,808.31	16,264.65
Construction and Repair	23,195.72	70,937.25	926.97	....	12.01	95,071.95	11,800.59	....	....	1,120.48	12,921.07	82,150.88
Steam Engineering	22,806.98	3,207.26	203.24	....	50.10	26,267.58	4,508.91	111.03	....	616.59	5,236.53	21,031.05
Naval Academy	20.23	12.65	....	....	....	32.88	8.38	....	....	....	8.38	24.50
Total	66,589.83	98,340.57	2,756.83	2,874.95	72.50	170,634.68	40,095.85	183.07	....	2,602.93	42,881.85	127,752.63

Classified abstract of property returns, form shore stations, for the year ending June, 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issued.	Balance remaining on hand.
Class 44.—Metals: Steel, sheet, plate, spring.												
Yards and Docks	$338.01	$40.94				$378.95	$41.74				$41.74	$337.21
Equipment and Recruiting		38.35	$32.85			71.20	63.80				63.80	7.40
Navigation	7.40					7.40				$7.40	7.40	
Ordnance	151.65	12,379.23	243.01	$42.70	$7,034.26	19,850.85	19,461.38				19,461.38	389.47
Construction and Repair	68,118.50	266,013.60	329.15			334,461.25	118,765.62			56.63	118,822.25	215,639.00
Steam Engineering	37,218.57	56,830.10	88.75		446.12	94,583.54	30,641.71	$45.00		632.70	31,319.41	63,264.13
Naval Academy		15.51				15.51						15.51
Total	105,834.13	335,317.73	693.76	42.70	7,480.38	449,368.70	168,974.25	45.00		696.73	169,715.98	279,652.72
Class 45.—Metals: Scrap brass, copper, lead, steel, zinc, etc.												
Yards and Docks	772.38					772.38	23.10				23.10	749.28
Equipment and Recruiting	10.00		1,558.21		189.00	1,757.21	91.36				91.36	1,665.85
Navigation	1,509.21					1,509.21				1,509.21	1,509.21	
Ordnance	24,225.23			2,387.96	4,992.64	31,605.83	5,334.30			134.40	5,468.70	26,137.13
Construction and Repair	9,513.85		2,302.72	1,725.75	1,273.08	14,815.40	1,757.44	50.19		3,421.34	5,228.97	9,586.43
Steam Engineering	45,297.84		4.80		3,969.50	49,272.14	19.64	3,361.80			3,381.44	45,890.70
Total	81,328.51		3,865.73	4,113.71	10,424.22	99,732.17	7,225.84	3,411.99		5,064.95	15,702.78	84,029.39
Class 46.—Metals, scrap-iron.												
Yards and Docks	1.00		.23			1.23	.23				.23	1.00
Equipment and Recruiting	75.50		19.76		323.80	419.06	196.72	7.51		80.25	284.48	134.58
Navigation			68.00			68.00	68.00				68.00	
Ordnance	49.37		10.16		427.01	486.54				1.76	1.76	484.78
Construction and Repair	1,150.01		12.25			1,162.26						1,162.26
Steam Engineering	5,561.03	55.58	5.17	8.98	.20	5,630.96	10.05	5.17		.93	16.15	5,614.81
Naval Academy	1.24					1.24	1.24				1.24	
Total	6,838.15	55.58	115.57	8.98	751.01	7,760.29	276.24	12.68		82.94	371.86	7,397.43

Class 47.—Nails, spikes, etc.												
Yards and Docks	6,388.80	1,670.26	347.50			8,406.56	2,840.29			41.61	2,881.90	5,524.66
Equipment and Recruiting	396.35	51.22	99.27			546.84	73.50			67.42	140.92	405.92
Navigation	19.84	119.90	5.75			145.49	125.65			19.84	145.49	
Ordnance	3,817.82	519.50	117.37	4.20		3,958.89	817.05	$0.70		40.90	858.65	3,100.24
Construction and Repair	85,262.85	837.64	1,492.29	910.20	31.17	88,534.15	3,722.40	11.57	$0.30	2,314.56	6,048.83	82,485.32
Steam Engineering	4,340.95	99.62	36.83		.45	4,477.85	236.22	3.65		164.17	404.04	4,073.81
Provisions and Clothing		89.15	1.20			90.35	90.35				90.35	
Naval Academy	99.02	330.11				429.13	178.77				178.77	250.36
Total	99,825.63	3,717.40	2,100.21	914.40	31.62	106,589.26	8,084.23	15.92	.30	2,648.50	10,748.95	95,840.31
Class 48.—Naval stores.												
Yards and Docks	730.35	45.31	62.60			838.26	460.77		.76	49.69	511.22	327.04
Equipment and Recruiting	2,059.76	1,037.05	685.24	9.90	18.36	3,810.81	527.02	56.43		1,443.43	2,026.88	1,783.43
Navigation	4.00	67.06	19.00			90.06	86.06			4.00	90.06	
Ordnance	299.20	442.43	49.30			791.43	440.26			45.69	485.95	305.48
Construction and Repair	6,248.96	1,461.12	685.81		511.25	8,906.64	1,609.65	448.26		1,310.90	3,368.81	5,537.83
Steam Engineering	276.71	195.28	105.75		5.66	583.40	167.46	5.40		157.01	329.87	253.53
Provisions and Clothing		21.20	5.60			26.80	26.80				26.80	
Naval Academy	4.56	95.38				99.94	88.73				88.73	11.21
Total	9,623.54	3,364.83	1,613.30	9.90	535.27	15,146.84	3,406.75	510.09	.76	3,010.72	6,928.32	8,218.52
Class 49.—Nuts, square, hexagon, etc.												
Yards and Docks	791.86	43.80	4.80			840.46	71.44			12.68	84.12	756.84
Equipment and Repair			20.30			20.30	20.06				20.06	.24
Navigation	.24					.24				.24	.24	
Ordnance	1,504.17	1,042.98	107.98			2,655.13	1,043.79	10.74			1,054.53	1,600.60
Construction and Repair	2,516.81	179.59	13.20	.75	7.74	2,747.59	430.99			14.78	445.77	2,301.82
Steam Engineering	20,389.55	1,389.80	1,840.50	105.72	1,301.94	24,997.51	675.94	2,073.28		2,108.23	4,857.45	20,140.06
Naval Academy	29.95	6.68				36.63	14.02				14.02	22.61
Total	25,232.08	2,662.85	1,986.78	106.47	1,309.68	31,297.86	2,256.24	2,084.02		2,135.93	6,476.19	247,821.67
Class 50.—Oils, illuminating and lubricating, grease.												
Yards and Docks	1,068.80	3,625.77	369.83			5,084.40	3,931.86	31.36		39.22	4,002.44	1,081.96
Equipment and Recruiting	1,057.47	10,898.45	16,299.69		4.73	27,740.34	1,135.98	40.63	15.60	13,395.53	14,587.60	13,152.65
Navigation	10,327.91	295.71	875.34		101.50	11,000.46	255.59	265.57	12.22	11,067.08	11,600.46	
Ordnance	2,169.56	2,857.82	3,452.73	50.60		8,630.71	5,484.04			1,807.61	6,791.65	1,239.06
Construction and Repair	2,443.65	2,307.64	682.50			5,433.79	3,112.46			109.24	3,221.70	2,212.09
Steam Engineering	18,760.84	13,183.43	4,707.39		544.36	37,146.02	4,702.44	610.75	2.20	18,004.82	23,320.21	13,825.81
Provisions and Clothing		50.01	61.20			111.21	111.21				111.21	
Naval Academy	8.28	153.86				162.14	121.49				121.49	40.65
Total	35,836.51	32,392.69	26,448.68	50.60	650.59	95,309.07	18,855.02	948.31	30.02	43,923.50	63,756.85	31,552.22

Classified abstract of property returns, from shore stations, for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 51.—Packing and rubber.												
Yards and Docks	$900.46	$44.98	$58.03			$1,003.47	$260.88			$13.93	$274.81	$728.66
Equipment and Recruiting	615.18	116.52	310.38		$133.97	1,176.05	265.48	$347.11		220.37	832.96	343.09
Navigation	8.26	41.20	23.17			72.63	66.58			6.05	72.63	
Ordnance	939.92	2,939.28	50.93	$25.49	8.85	3,961.47	381.32	19.85		2,572.18	2,973.35	991.12
Construction and Repair	5,244.42	1,096.57	540.46		167.36	7,048.81	1,165.93	19.70		547.64	1,733.27	5,315.54
Steam Engineering	47,062.13	2,937.71	3,985.57		1,280.51	55,265.92	2,744.45	1,549.62		5,369.04	9,663.11	45,602.81
Naval Academy	55.04	90.78				145.82	70.16				70.16	75.66
Total	54,825.41	7,267.04	4,968.54	25.49	1,590.69	68,677.17	4,954.80	1,936.28		8,729.21	15,620.29	53,056.88
Class 52.—Paints, varnishes, chemicals, drugs, etc.												
Yards and Docks	6,491.57	1,445.05	284.82			8,221.44	3,755.70	84.16	$1.35	266.63	4,107.84	4,113.60
Equipment and Recruiting	1,135.54	1,002.12	378.37	7.00	49.18	2,572.21	1,099.80	7.39		454.27	1,561.46	1,010.75
Navigation	213.95	656.53	1.00			871.48	654.53			216.95	871.48	
Ordnance	872,092.16	6,597.07	650.37	6.72	40.20	879,386.52	6,139.54	41.89		1,865.89	8,047.32	871,339.20
Construction and Repair	17,011.06	36,456.24	3,583.29	92.28	64.43	57,207.32	21,054.66	217.30	17.00	17,320.15	38,609.11	18,598.21
Steam Engineering	11,880.84	3,600.32	671.48		141.45	16,294.09	2,493.32	527.96		2,923.94	5,945.22	10,348.87
Provisions and Clothing		533.53	10.25			543.78	543.78				543.78	
Naval Academy	738.47	2,060.15				2,798.62	2,311.43				2,311.43	482.19
Total	909,558.61	52,351.01	5,579.58	106.00	295.26	967,890.46	38,052.76	878.70	18.35	23,047.83	61,997.64	905,892.82
Class 53.—Pipe and fittings.												
Yards and Docks	11,841.14	2,319.91	393.09			14,554.14	3,855.67			322.82	4,178.49	10,375.66
Equipment and Recruiting	1,592.38	267.92	386.03		.05	2,246.38	381.24	17.00		1,814.26	2,212.50	33.88
Navigation	6.65	578.58	1,555.91			2,141.14	2,125.00			6.65	2,131.65	9.49
Ordnance	5,096.12	7,765.56	245.58		350.00	13,456.26	3,738.51	850.00		300.05	4,888.56	9,067.70
Construction and Repair	34,372.91	6,783.54	701.91			41,859.36	4,263.78			706.81	4,970.59	36,888.77
Steam Engineering	147,914.65	30,769.02	3,968.81	1,680.28	1,609.62	185,962.38	18,087.61	2,036.18		9,158.50	29,277.29	156,685.09
Provisions and Clothing			2.98			2.98	2.98				2.98	
Naval Academy	682.34	1,485.65				2,118.39	1,336.79				1,336.79	781.60
Total	201,457.19	49,969.58	7,274.31	1,680.28	1,959.07	262,341.03	33,791.58	2,403.18		12,304.09	48,498.85	213,842.18

Class 54.—Provisions.												
Yards and Docks	2.57	10.43	....	....	....	13.30	7.03	....	....	....	7.03	6.27
Ordnance	55.78	....	5.83	....	....	61.61	9.73	....	....	....	9.73	51.88
Construction and Repair	4.25	....	....	....	....	4.25	....	....	....	....	....	4.25
Steam Engineering	28.54	5.00	4.20	....	....	37.74	....	1.74	....	2.46	4.20	33.54
Provisions and Clothing	95,964.00	146,830.07	82,217.64	....	10,938.34	335,950.05	148.04	12,783.32	12,734.92	217,653.59	243,319.87	92,630.18
Total	96,055.44	146,845.50	82,227.67	....	10,938.34	336,060.95	164.80	12,785.06	12,734.92	217,656.05	243,340.83	92,726.12
Class 55.—Pyrotechnic signals, flags, etc.												
Yards and Docks	60.24	89.35	397.68	....	....	547.27	234.23	38.10	....	176.96	449.29	97.98
Equipment and Recruiting	....	1.08	49,171.82	15,013.42	796.45	64,982.77	1,663.85	12,379.39	....	10,100.00	33,203.24	31,779.53
Navigation	33,341.38	....	4,181.72	....	1,224.93	38,748.03	26.01	1,569.49	186.27	36,966.26	38,748.03	....
Ordnance	4,083.53	....	58.87	....	3.80	4,146.20	40.70	28.82	....	75.47	144.99	4,001.21
Construction and Repair	239.05	1.50	9.56	60.46	4.56	315.13	13.48	4.56	....	55.42	73.46	241.67
Naval Academy	....	....	6.31	....	....	6.34	6.34	....	....	....	6.34	....
Total	37,724.20	91.93	53,825.99	15,073.88	2,029.74	108,745.74	1,984.61	14,020.36	186.27	56,434.11	72,625.35	36,120.39
Class 56.—Rivets, lag screws, and washers.												
Yards and Docks	1,219.51	32.62	67.03	....	....	1,319.06	127.24	....	....	6.87	134.11	1,184.95
Equipment and Recruiting	230.54	.60	18.71	....	....	249.85	31.31	....	....	.60	31.91	217.94
Navigation	....	8.28	.08	....	....	8.36	8.36	....	....	....	8.36	....
Ordnance	1,748.90	179.55	14.75	....	....	1,943.20	372.09	....	....	22.58	394.67	1,548.53
Construction and Repair	16,891.22	23,226.33	54.26	24.78	1.91	40,198.50	13,031.19	5.71	....	186.70	13,243.60	26,954.90
Steam Engineering	23,526.58	3,388.59	195.96	....	62.43	26,173.56	1,166.31	96.63	....	217.21	1,420.15	24,753.41
Naval Academy	6.60	12.74	....	....	....	19.34	7.82	....	....	....	7.82	11.52
Total	42,623.35	26,848.61	350.79	24.78	64.34	69,911.87	14,704.32	102.34	....	433.96	15,240.62	54,671.25
Class 57.—Rolling stock.												
Yards and Docks	1,257.80	2,399.09	....	....	....	3,656.89	2,423.41	....	....	....	2,423.41	1,233.48
Equipment and Recruiting	53.00	261.70	81.40	45.50	10.00	451.60	91.90	14.00	....	190.50	296.40	155.20
Navigation	....	375.00	....	....	....	375.00	375.00	....	....	....	375.00	....
Ordnance	4,225.59	792.15	49.00	....	8.00	5,074.74	684.75	....	....	56.40	741.15	4,333.59
Construction and Repair	18.50	35.00	....	....	....	53.50	18.50	....	....	15.00	33.50	20.00
Steam Engineering	255.36	30.75	....	....	....	286.11	30.75	....	....	....	30.75	255.36
Provisions and Clothing	....	32.90	....	....	....	32.90	32.90	....	....	....	32.90	....
Naval Academy	....	13.75	....	....	....	13.75	13.75	....	....	....	13.75	....
Totals	5,810.25	4,840.34	130.40	45.50	18.00	9,944.49	3,670.96	14.00	....	261.90	3,946.86	5,997.68

Classified abstract of property returns, from shore stations, for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balances on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 58.—Screws, brass, iron, steel, etc.												
Yards and Docks	$1,258.65	$93.40	$67.15	....	....	$1,419.20	$212.93	....	....	$27.81	$240.74	$1,178.46
Equipment and Recruiting	51.56	8.40	63.82	....	....	125.78	31.09	....	....	15.61	46.70	79.08
Navigation	24.67	42.16	3.40	....	....	70.23	33.85	....	....	36.38	70.23	....
Ordnance	4,515.84	1,126.71	27.00	....	$1.54	5,671.09	640.17	....	....	8.88	649.05	5,022.04
Construction and Repair	13,690.72	1,222.72	399.22	$57.44	12.96	15,383.06	1,942.24	$1.52	....	807.00	2,840.76	12,542.30
Steam Engineering	7,623.84	169.73	195.47	268.22	1.15	8,258.41	412.82	11.79	....	651.10	1,075.71	7,182.70
Naval Academy	117.10	75.16	....	....	....	192.26	81.15	....	....	....	81.15	111.11
Totals	27,282.38	2,738.28	758.06	325.66	15.65	31,120.03	3,354.25	18.31	....	1,636.78	5,004.34	26,115.69
Class 59.—Ship and boat equipment and fittings.												
Yards and Docks	2,948.22	110.72	64.91	....	13.50	3,137.35	225.48	....	....	19.51	244.09	2,892.36
Equipment and Recruiting	75,712.29	8,500.19	18,865.32	5,558.58	2,089.81	110,726.19	5,088.77	20,763.28	$110.48	22,898.14	48,760.67	61,965.52
Navigation	2,295.08	17.50	541.80	....	6.24	2,860.62	105.70	149.75	....	2,605.17	2,860.62	....
Ordnance	9,306.68	289.40	1,287.33	626.94	640.81	12,151.16	1,050.77	316.83	....	1,554.25	2,921.85	9,229.31
Construction and Repair	172,317.67	21,194.97	102,142.36	72,089.44	14,574.83	382,319.27	23,704.52	28,041.03	6,475.08	108,928.13	169,148.76	213,170.51
Steam Engineering	435.65	26.89	144.76	138.87	3.40	749.57	100.67	8.15	....	198.47	307.29	442.28
Provisions and Clothing	....	15.64	....	....	....	15.64	15.64	....	....	....	15.64	....
Naval Academy	.96	58.88	6.24	....	....	66.08	44.61	....	....	....	44.61	21.47
Totals	263,016.55	30,214.19	123,052.72	78,413.83	14,578.23	512,025.88	32,336.16	49,279.04	6,485.56	136,203.67	224,304.43	287,721.45
Class 60.—Small stores.												
Yards and Docks	1.90	2.00	....	....	....	3.90	.66	....	....	....	.66	3.24
Equipment and Recruiting	5.87	11.04	120.98	....	....	137.89	99.60	....	....	26.99	126.59	11.30
Navigation	7.16	....	....	....	....	7.16	....	....	....	7.16	7.16	....
Ordnance	94.62	102.45	59.16	....	....	257.23	7.44	....	....	4.20	11.64	245.59
Construction and Repair	.67	....	....	....	....	.67	....	....	....	....	....	.67
Steam Engineering	51.12	4.15	40.06	....	....	95.33	8.67	....	....	10.99	28.06	66.66
Provisions and Clothing	75,601.56	68,800.59	52,883.45	....	78.10	197,453.70	16.23	10,151.50	2,838.52	93,987.95	106,994.20	90,459.50
Naval Academy	....	.11	....	....	....	.11	.11	....	....	....	.11	....
Totals	75,852.90	68,921.34	53,103.64	....	78.10	197,965.96	132.71	10,151.50	2,838.52	94,046.29	107,169.02	90,786.96

Class 61.—*Stationery, books, and blanks.*												
Yards and Docks..........	146.91	3,108.80	121.10	....	....	3,376.87	3,203.83	....	....	....	3,203.83	173.04
Equipment and Recruiting.	2,222.67	6,621.18	7,750.95	....	50.88	16,645.68	2,011.70	875.57	....	6,722.40	9,609.67	7,036.01
Navigation	6,873.62	179.06	806.10	....	97.85	7,956.63	797.03	90.74	....	7,068.86	7,956.03	....
Ordnance	1,603.18	2,776.60	180.05	....	41.60	4,601.43	1,550.92	26.11	....	188.08	1,765.11	2,836.32
Construction and Repair...	352.79	1,304.48	107.10	....	....	1,764.37	1,316.21	1.75	....	94	1,318.90	445.47
Steam Engineering	4,825.00	1,285.00	703.41	....	11.73	6,825.14	1,501.35	51.23	1.50	745.20	2,299.28	4,525.86
Provisions and Clothing...	5,025.56	7,965.75	1,490.07	....	883.41	15,364.79	6,524.21	....	....	3,958.43	10,482.64	4,882.15
Naval Academy	235.81	1,331.92	....	....	....	1,567.73	1,490.19	....	....	....	1,490.19	77.54
Totals	21,285.54	24,572.79	11,158.84	....	1,085.47	58,102.64	18,395.44	1,045.40	1.50	18,683.91	38,126.25	19,976.39
Class 62.—*Stores and fixtures.*												
Yards and Docks..........	2,033.88	2,500.51	....	....	....	4,534.39	2,193.60	364.83	....	177.50	2,735.93	1,798.46
Equipment and Recruiting.	40,364.97	2,736.05	27,078.30	18,095.57	7,052.70	95,327.59	5,715.35	18,417.24	1,071.68	36,056.86	61,261.13	34,066.46
Navigation	107.05	310.62	708.28	....	....	1,125.95	1,018.90	....	....	107.05	1,125.95	....
Ordnance	344.61	1,401.72	....	....	6.00	1,752.33	900.77	....	....	....	900.77	851.56
Construction and Repair...	418.55	193.62	229.00	3.50	....	844.67	196.62	....	....	228.50	425.12	419.55
Steam Engineering	3,876.56	1,887.13	723.57	2,689.09	263.43	9,439.78	698.74	303.47	....	4,200.66	5,202.87	4,236.91
Provisions and Clothing...	....	35.60	....	....	....	35.60	35.60	....	....	....	35.60	....
Naval Academy	273.00	963.74	....	....	....	1,236.74	1,093.49	....	....	....	1,093.49	143.25
Totals	47,418.62	10,028.99	28,739.15	20,788.16	7,322.13	114,297.06	11,853.07	19,085.54	1,071.68	40,770.57	72,780.86	41,516.19
Class 63.—*Supplies, plumbers' and gas-fitters'.*												
Yards and Docks..........	1,808.88	956.63	....	....	....	2,765.51	985.83	....	....	20.69	1,006.52	1,758.99
Equipment and Recruiting.	712.65	61.20	....	....	....	773.85	....	....	....	740.95	740.95	32.90
Navigation	....	551.37	740.95	....	....	1,292.32	1,291.46	....	....	....	1,291.46	86
Ordnance	24.32	163.17	....	....	....	187.49	124.52	....	....	....	124.52	62.97
Construction and Repair...	2,487.84	1,132.95	4.72	52.58	2.50	3,680.59	886.37	4.00	....	368.40	1,258.77	2,421.82
Steam Engineering	5.33	2.36	1.50	....	....	9.18	2.90	....	....	....	2.90	6.28
Naval Academy	387.77	800.74	....	....	....	1,188.51	982.23	....	....	....	982.23	206.28
Totals	5,426.78	3,668.42	747.17	52.58	2.50	9,897.45	4,273.31	4.00	....	1,130.04	5,407.35	4,490.10
Class 64.—*Tin and metal ware.*												
Yards and Docks..........	120.95	15.15	10.60	....	....	146.70	85.41	....	....	2.50	87.91	58.79
Equipment and Recruiting.	836.37	2,329.16	4,313.11	....	152.62	7,631.26	505.15	286.24	1,537.68	2,795.46	5,124.53	2,506.73
Navigation	966.55	108.11	220.33	....	1.30	1,294.29	200.02	.30	....	1,093.97	1,294.29	....
Ordnance	320,456.84	53.71	47,399.76	22,472.34	27,942.83	418,326.48	106.90	27,939.35	....	98,043.98	126,090.23	292,236.25
Construction and Repair..	49,274.78	166.92	753.41	747.76	13.80	50,956.67	178.23	158.48	4.00	1,042.85	1,383.56	49,573.11

Classified abstract of property returns, from shore stations, for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balances on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 64.—Tin and metal ware—Continued.												
Steam Engineering	$2,566.96	$183.70	$1,605.30	$1,113.90	$281.06	$5,750.92	$211.37	$613.82	$0.92	$1,840.58	$2,666.69	$3,084.23
Provisions and Clothing		.35	.24			.59	.59				.59	
Naval Academy	8.43	16.21				24.64	22.06				22.06	2.58
Totals	374,230.88	2,871.31	54,302.75	24,335.00	28,391.61	484,131.55	1,309.73	28,998.19	1,542.60	104,819.34	136,669.86	347,461.69
Class 65.—Tools: Augers, bits, braces, chisels, planes.												
Yards and Docks	2,465.51	6.70	79.06			2,551.27	111.03	2.80		2.75	116.58	2,434.69
Equipment and Recruiting	39.37	3.90	40.65	4.09	3.00	91.01	11.39	22.36	1.00	19.79	54.54	36.47
Ordnance	2,153.78	148.53	63.59	42.17	8.00	2,416.07	236.49	34.91		83.50	354.90	2,061.17
Construction and Repair	37,058.86	466.61	916.35	62.60	171.30	38,675.72	1,010.32	597.62		1,142.83	2,750.77	35,924.95
Steam Engineering	1,522.16	240.00	441.14	51.15	114.91	2,369.36	161.62	287.80	1.58	524.99	975.99	1,398.37
Provisions and Clothing		.90	5.77			6.67	6.67				6.67	
Naval Academy		26.14			.08	26.22	26.14	.08			26.22	
Totals	43,239.68	892.78	1,546.56	160.01	297.29	46,136.32	1,563.66	945.57	2.58	1,773.86	4,285.67	41,855.65
Class 66.—Files.												
Yards and Docks	2,815.80	93.04	5.88			2,916.72	664.88			118.30	783.18	2,133.54
ment and Recruiting	15.94	13.95	169.17			199.06	157.03			13.38	170.41	28.65
ion		2.25				2.25	2.25				2.25	
[illegible]	951.91	3,221.78	365.44			4,539.13	2,571.00	22.47		234.02	2,827.49	1,711.64
nd Repair	9,073.71	802.13	417.70		9.68	10,303.22	1,971.33	74.03		756.29	2,801.65	7,501.67
ering	16,357.08	336.36	1,145.18		199.75	18,038.37	1,319.19	691.67		911.93	2,922.79	15,115.58
Clothing			.41			.41	.41				.41	
[illegible]	37.22	42.64				79.86	27.14				27.14	52.72
Totals	29,251.66	4,514.15	2,103.78		209.43	36,079.02	6,713.23	783.17		2,033.92	9,535.32	26,543.70

Class 67.—Tools: Hammers, saws, sledges, and wrenches												
Yards and Docks	895.53	40.58	1.63			937.74	115.87	.80		3.28	119.95	817.79
Equipment and Recruiting	742.06	45.00	101.73	15.00	14.90	918.69	59.89	114.53		127.05	301.47	617.22
Navigation			13.81			13.81	13.81				13.81	
Ordnance	1,533.16	445.43	178.48	264.17	249.97	2,671.21	346.47	124.01		284.52	755.00	1,916.21
Construction and Repair	7,690.32	1,306.14	795.17	143.01	99.78	10,036.42	1,383.07	458.43	3.98	973.80	2,819.28	7,217.14
Steam Engineering	5,589.96	722.18	1,406.58	465.48	543.49	8,787.69	623.56	792.94	5.67	1,500.45	2,922.62	5,865.07
Provisions and Clothing		7.55	6.05			13.60	13.60				13.60	
Naval Academy	2.72	13.80				16.52	13.98				13.98	2.54
Total	16,453.75	2,580.68	2,563.45	889.66	908.14	23,395.68	2,570.25	1,490.71	9.65	2,889.10	6,959.71	16,435.97
Class 68.—Tools: Miscellaneous.												
s and Docks	2,634.29	385.15	42.68			3,062.12	545.52	4.50		10.47	560.49	2,501.63
pment and Recruiting	8,021.77	350.22	1,241.04	495.71	311.24	10,419.98	577.70	1,182.04	2.60	1,355.89	3,118.83	7,301.15
ation	55.30	24.02	88.43			167.75	104.45			63.30	167.75	
nce	6,210.54	2,716.48	954.17	155.45	602.40	10,639.04	2,326.46	575.64		1,394.53	4,296.63	6,342.41
ruction and Repair	36,190.90	5,530.04	2,038.83	5,056.53	236.28	49,052.58	5,499.89	979.75	5.48	4,123.69	10,608.81	38,443.77
n Engineering	43,847.13	2,351.65	6,692.50	851.59	1,854.46	55,597.33	3,127.69	3,754.37		5,478.69	12,360.75	43,236.58
isions and Clothing		56.33	3.65			59.98	59.98				59.98	
l Academy	48.57	298.43				347.00	272.14				272.14	74.86
Total	97,008.50	11,712.32	11,061.30	6,559.28	3,004.38	129,345.78	12,513.83	6,496.90	8.08	12,426.57	31,445.38	97,900.40
—Wire and wire cloth.												
nd Docks	478.16	165.18	30.09			673.43	298.27			1.91	300.18	373.25
ent and Recruiting	1,167.49	7,957.35	825.90			9,950.74	8,163.60			420.75	8,584.35	1,366.39
ion	628.97	37.44				666.41	41.44			624.97	666.41	
e	1,963.70	240.03	17.11			2,220.84	539.32			23.24	562.56	1,658.28
tion and Repair	9,363.13	293.96	62.16		.50	9,719.75	545.19	.74		129.99	675.92	9,043.83
n Engineering	5,969.52	472.76	134.32	43.00	11.90	6,631.50	455.34	29.55		609.26	1,094.15	5,537.35
visions and Clothing		194.40				194.40	194.40				194.40	
al Academy	6.13	27.10				33.23	16.97				16.97	16.26
Total	19,577.10	9,388.22	1,069.58	43.00	12.40	30,090.30	10,254.53	30.29		1,810.12	12,094.94	17,995.36
Class 70.—Wooden and willowware.												
Yards and Docks	360.57	38.15	.42			399.14	169.67			2.75	172.42	226.72
Equipment and Recruiting	1,383.81	1,057.32	32.26			2,473.39	262.72	41.50	952.11		1,256.33	1,217.06
Navigation		13.75	195.70			209.45	209.20			.25	209.45	
Ordnance	16,319.61	372.15	899.67	382.25	42.68	18,016.36	407.49	284.87		680.73	1,433.09	16,613.27

Classified abstract of property returns, from shore stations, for the year ending June 30, 1890—Continued.

Bureau.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Manufactured articles.	Statutory board.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance remaining on hand.
Class 70.—Wooden and willow ware—Continued.												
Construction and Repair	$13,753.11	$1,039.30	$5,049.69	$8,066.10	$155.59	$28,063.79	$1,407.97	$1,794.23	$738.90	$8,378.27	$12,319.37	$15,744.42
Steam Engineering	557.12	156.52	148.96	149.13	44.42	1,056.15	151.07	66.90	....	224.26	442.23	613.92
Provisions and Clothing	....	20.65	....	....	....	20.65	20.65	....	....	....	20.65	....
Naval Academy	2.59	23.92	....	....	....	26.51	24.50	....	....	....	24.50	2.01
Total	32,376.81	2,721.76	6,356.70	8,597.48	242.69	50,295.44	2,713.27	2.187.50	1,691.01	9,286.26	15,878.04	34,417.40
Class 71.—Miscellaneous.												
Yards and Docks	24,358.29	34,548.78	126.41	....	....	59,033.48	48,092.90	98.00	....	179.04	48,369.94	10,663.54
Equipment and Recruiting	7,479.95	19,460.67	1,107.35	73.87	....	28,121.84	25,195.65	24.50	....	1,286.76	26,506.91	1,614.93
Navigation	782.41	1,016.87	621.75	....	.75	2,421.78	1,513.58	....	....	819.38	2,332.96	88.82
Ordnance	17,197.18	343,546.38	306.51	1,106.56	480.22	362,636.85	329,415.55	2,231.68	....	1,754.15	333,401.38	29,235.47
Construction and Repair	2,823.61	2,064.79	302.99	22,132.68	.74	27,324.81	2,757.76	2.52	60.00	235.06	3,055.34	24,269.47
Steam Engineering	12,813.18	4,530.78	832.77	572.97	301.58	19,051.28	3,974.80	445.99	2.50	3,656.99	8,079.28	10,972.00
Provisions and Clothing	12,710.58	5,749.42	7,641.13	....	44.00	26,145.13	1,144.46	1,813.29	7.18	11,330.88	14,295.81	11,849.82
Naval Academy	275.21	7,074.20	....	....	....	7,349.41	7,090.68	....	....	....	7,090.68	258.73
Total	78,440.41	417,991.89	10,938.91	23,886.08	827.29	532,084.58	419,185.38	4,615.98	69.68	19,261.26	443,132.30	88,952.28

APPENDIX I.

Condensed abstract of property returns from shore stations, for the year ending June 30, 1890.

Stations.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Statutory board.	Manufactured articles.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance on hand June 30, 1890.
Bureau of Yards and Docks.												
Portsmouth	$22,232.95	$12,615.56	$629.16	....	....	$35,477.67	$11,270.53	....	....	$36.48	$11,307.01	$24,170.66
Boston	14,555.51	17,423.29	843.71	....	....	32,822.51	18 176.05	....	....	64.99	18,241.04	14,581.47
New York	39,827.62	77,531.60	11,306.86	....	....	128,666.08	97,258.74	$117.90	....	1,466.14	98,842.78	29,823.30
League Island	16,275.66	5,186.70	378.61	$6.80	....	21,847.80	6,247.78	115.12	....	65.49	6,428.39	15,419.41
Washington	19,877.89	11,513.79	259.12	.02	$28.09	31,678.91	10,524.86	.02	$3.34	1,852.57	11,880.79	19,798.12
Norfolk	66,895.87	7,802.36	885.47	689.91	....	76.273.61	44,608.48	2,724.65	....	2,163.53	49,496.66	26,776.95
Pensacola	67,336.83	3,801.88	177.88	....	....	71,316.59	3,729.77	....	....	43.07	3,772.84	67,543.75
Mare Island	44,616.46	53,669.20	1,156.18	153.14	....	99,504.98	57,300.09	6,776.41	....	688.40	64,764.90	34,830.08
New London	5,553.05	1,523.15	112.29	....	....	7,188.49	967.08	1,353.68	....	....	2,320.76	4,867.73
Key West	482.75	1,218.25	1,645.66	....	....	3,346.66	1,116.58	....	....	....	1,116.58	2,230.08
Total	297,654.59	192,285.78	17,894.97	849.87	28.09	508,213.30	251,199.96	11,087.78	3.34	5,880.67	268,171.75	240,041.55
Bureau of Equipment and Recruiting.												
Portsmouth	111,927.27	7,369.30	67,880.16	14,236.37	41,686.72	243,089.82	29,681.77	41,079.83	28,216.19	36,400.02	135,377.81	107,712.01
Boston	160,409.23	81,531.53	5,940.13	29,385.89	182,029.93	459,296.70	91,229.55	53,481.56	4,285.71	198,995.65	347,992.47	111,304.23
New York	425,170.00	84,520.83	251,993.78	42,711.79	63,775.70	868,172.10	71,214.04	179,536.59	18,838.61	251,187.72	515,826.96	352,345.14
Washington	50,219.48	3,344.39	10,132.82	1,443.54	104.85	65,245.08	383.96	335.40	....	32,706.58	33,425.94	31,819.14
League Island	23,320.45	6,801.24	55,189.04	....	....	85,310.73	2,366.69	1,367.44	....	36,417.69	40,151.82	45,158.91
Norfolk	181,595.84	27,249.87	195,724.08	40,120.61	36,934.61	481,625.01	24,031.27	83,542.24	795.12	125,648.70	234,017.33	247,607.68
Pensacola	31,571.00	6,163.90	281.47	121.38	....	38,137.75	877.95	619.88	....	12,519.29	14,017.12	24,120.63
Mare Island	434,205.26	89,105.12	110.940.83	15,438.31	68,935.56	718,625.07	42,231.05	54,166.40	227.40	175,879.04	272,503.89	446,121.18
New London	32,266.16	537.00	530.45	....	....	33,333.61	245.65	....	....	337.20	582.85	32,750.76
Torpedo Station	172.86	2,985.00	....	....	....	3,157.86	1,204.12	....	....	1,868.18	3,072.30	85.56
Training Station	30,839.17	12,860.34	9,838.05	70.96	....	58,608.52	12,760.01	640.11	57.50	12,665.30	26,122.92	27,485.60
Annapolis	25,491.96	4,318.57	63,341.84	64.73	....	93,217.10	9,336.84	4,919.13	....	50,463.37	64,749.34	28,467.76
Key West	29,587.55	7,182.77	567.13	....	....	87,837.45	844.65	906.81	1,343.55	17,715.95	20,810.96	16,526.49
Total	1,536,776.23	333,969.86	772,359.78	143,583.58	393,467.85	3,180 156.80	286,407 55	420,625.39	48,814.08	952,804.69	1,708,651.71	1,471,505.09

Condensed abstract of property returns from shore stations, for the year ending June 30, 1890—Continued.

Stations.	Receipts.						Expenditures.					
	Balance on hand July 1, 1889.	Purchased.	Transfers.	Statutory board.	Manufactured articles.	Total receipts.	For use.	Condemned.	Expended by sale, etc.	Transferred.	Total issues.	Balance on hand June 30, 1890.
Bureau of Navigation.												
Portsmouth	$2,924.09	$2.35	$1,442.78	$358.50	....	$4,727.72	$2.35	$644.75	$366.35	$3,714.27	$4,727.72	....
Boston	1,407.63	....	69.30	....	....	1,476.93	....	....	....	1,476.93	1,476.93	....
New York	33,735.37	....	....	....	....	33,735.37	....	....	....	33,735.37	33,735.37	....
League Island	2,290.70	....	....	....	....	2,290.70	....	....	....	2,290.70	2,290.70	....
Washington	2,728.08	6.14	....	184.87	....	2,919.09	9.18	....	....	2,909.91	2,919.09	....
Norfolk	8,421.50	285.44	5,321.28	1,203.27	....	15,231.49	180.02	1,869.21	....	13,182.26	15,231.49	....
Mare Island	16,423.86	....	....	....	....	16,423.86	....	....	....	16,423.86	16,423.86	....
Training station	3,140.51	10,741.51	8,665.95	....	$205.62	22,753.59	10,040.42	....	....	3,847.51	22,387.93	$365.66
Annapolis	3,228.28	....	....	....	....	3,228.28	....	....	....	3,228.28	3,228.28	....
Total	74,300.02	11,035.44	15,499.31	1,746.64	205.62	102,787.03	19,231.97	2,513.96	366.35	80,809.09	102,421.37	365.66
Bureau of Ordnance.												
Portsmouth	546,764.16	61.26	30,257.65	3,663.89	444.25	581,191.21	679.40	7,543.61	1,050.60	63,649.98	72,923.68	508,267.53
Boston	1,955,745.71	385.74	38,450.91	....	61.80	1,994,644.16	514.20	22.04	....	138,659.14	139,195.38	1,855,448.78
New York	2,972,774.28	153,214.01	419,452.13	165,796.73	4,542.09	3,715,779.24	16,977.89	139,220.23	....	578,463.75	734,661.87	2,981,117.37
League Island	805,749.16	18,482.04	16,468.43	....	....	840,699.63	600.53	....	....	2,273.25	2,873.78	837,825.85
Washington	727,246.89	637,186.09	286,104.92	86,683.28	763,549.90	2,500,771.08	635,105.68	164,373.01	5.16	606,177.18	1,405,661.03	1,095,110.05
Norfolk	587,640.24	25,483.17	528,183.74	4,199.74	36,542.22	1,182,049.11	33,630.83	6,711.01	....	509,010.15	549,351.99	632,697.12
Pensacola	287,071.40	2.20	960.45	....	....	288,034.05	112.64	....	....	35.80	148.44	287,885.61
Mare Island	1,628,378.37	28,803.79	309,196.37	34,360.93	1,417.89	2,002,157.35	41,472.00	99,698.80	515.65	580,548.16	722,234.61	1,279,922.74
New London	2,813.31	4.30	63.00	....	....	2,880.61	13.54	....	....	....	13.54	2,867.07
Torpedo Station	22,940.94	48,636.06	4,869.41	....	8,221.51	84,667.92	36,760.51	....	....	19,234.46	55,994.97	28,672.95
Training Station	44,144.78	342.88	15,717.62	....	....	60,205.28	1,327.49	125.01	....	5,442.32	6,894.82	53,810.46
Naval Academy	180,176.60	1,061.10	54,247.03	99.36	....	235,584.09	7,371.39	2,273.72	....	25,353.18	34,998.24	200,585.85
Ordnance Proving Ground	163,729.58	14,471.36	294,295.83	164,280.81	....	638,777.58	28,418.40	12,112.35	....	301,544.62	342,075.37	296,702.21
Key West	2,443.00	....	367.49	....	....	2,810.49	....	....	....	323.40	323.40	2,487.03
Total	9,929,618.42	928,134.00	1,998,634.98	459,084.74	814,779.66	14,130,251.80	802,984.50	432,079.78	1,571.50	2,830,715.40	4,067,351.18	10,062,900.62
Bureau of Construction and Repair.												
Portsmouth	296,789.68	22,839.44	21,783.15	2,934.94	42,156.86	385,926.10	33,423.51	7,129.59	8,722.48	24,294.37	73,569.95	312,356.15
Boston	1,139,581.08	1,427.41	7,037.80	....	328.71	1,148,375.00	1,723.37	....	....	51,142.25	52,865.62	1,095,509.88
New York	606,912.67	396,414.94	73,313.32	7,132.21	19,092.36	1,102,865.50	305,902.08	16,720.57	....	51,965.55	374,597.20	728,268.30
League Island	120,356.07	2,633.79	807.48	36.09	....	123,833.43	5,558.56	300.07	....	4,372.40	10,237.03	113,596.40

Washington	135,771.53	5,155.06	4,353.48	.10	47,542.32	192,822.49	24,397.99	664.61	....	25,260.86	50,323.46	142,499.03
Norfolk	353,537.26	235,810.75	56,881.06	36,156.33	49,735.32	732,120.72	107,104.68	52,960.33	....	68,957.40	229,022.41	503,098.81
Pensacola	309,571.88	281.26	965.30	27.23	....	310,845.67	576.59	....	....	3,170.57	3,747.16	307,098.51
Mare Island	389,794.98	173,483.80	32,048.20	3,764.96	14,214.81	613,306.75	71,460.93	6,046.40	....	30,307.04	107,814.37	505,492.38
New London	2,301.15	197.17	3,290.11	....	....	5,788.43	207.62	2.97	....	....	210.59	5,577.84
Torpedo station	11.25	132.11	....	....	....	143.36	....	....	....	132.11	132.11	11.25
Training station	40,825.50	1,054.34	4,970.10	....	....	46,849.94	1,777.09	475.00	....	22,500.00	24,752.09	22,097.85
Naval Academy	43,029.63	1,703.22	19,034.55	....	....	63,767.40	2,301.86	803.23	....	18,845.40	21,950.49	41,816.91
Key West	1,108.47	67.50	1,555.59	1,791.32	....	4,522.88	.10	....	....	2,038.82	2,038.92	2,483.96
Total	3,439,511.15	839,700.79	226,042.14	51,843.18	174,070.41	4,731,167.67	554,434.38	85,117.77	8,722.48	302,986.77	951,261.40	3,779,906.27
Bureau of Steam Engineering.												
Portsmouth	121,822.41	7,130.30	9,005.14	2,183.83	14,342.98	154,484.66	12,003.62	2,221.98	3,858.62	8,407.09	26,491.31	127,993.85
Boston	146,795.39	3,025.70	2,256.49	1,978.85	33.86	154,090.20	3,978.21	12.88	....	8,265.08	12,256.17	141,834.03
New York	254,850.74	163,869.45	32,161.35	20,262.64	10,584.74	481,728.92	76,452.27	19,240.75	....	50,100.67	145,793.69	335,935.23
League Island	56,944.18	3,732.69	61.19	960.00	....	61,698.06	4,312.11	3,109.84	....	2,327.55	9,749.50	51,948.56
Washington	70,212.37	3,111.68	1,626.80	3,012.15	192.67	78,155.87	1,338.69	3,573.24	....	60,981.03	65,892.96	12,262.91
Norfolk	175,544.86	18,055.52	84,611.79	1,746.73	27,759.67	307,718.57	27,267.52	2,941.12	....	46,773.51	76,982.15	230,736.42
Pensacola	73,220.54	102.42	52.46	15.89	....	73,391.31	376.31	9.94	....	548.27	934.52	72,456.79
Mare Island	162,802.64	101,097.24	10,448.22	378.89	6,025.31	280,752.30	95,086.33	3,671.46	4.70	31,268.89	130,031.38	150,720.92
New London	4,161.10	221.68	77.02	....	....	4,459.80	245.60	....	....	25.00	270.60	4,189.20
Training station	3,476.01	1,472.91	4,053.48	....	....	9,002.40	2,096.97	7.50	....	15.85	2,119.32	6,883.08
Annapolis	1,899.31	2,126.54	2,688.65	....	....	6,714.50	5,876.33	....	....	30.60	5,906.93	807.57
Key West	17,318.01	74.43	1,088.49	....	....	18,480.93	10.89	....	....	4,123.43	4,134.32	14,346.61
Total	1,089,047.47	304,020.76	148,131.08	30,538.98	58,939.23	1,630,677.52	229,043.85	34,788.71	3,863.32	212,866.97	480,562.85	1,150,114.67
Bureau of Provisions and Clothing.												
Portsmouth	55,137.56	870.07	5,876.58	....	....	61,884.21	359.81	757.98	336.11	14,496.57	15,950.47	45,933.74
Boston	27,223.02	8,383.21	29,885.64	....	....	65,491.87	774.24	886.55	....	34,985.91	36,646.70	28,845.17
New York	238,693.19	426,037.76	37,220.39	11,380.24	132,577.98	845,909.56	10,105.22	60,226.24	96,624.39	415,123.66	582,079.51	263,830.05
League Island	20,308.43	3,063.35	9,503.77	75.23	....	32,950.78	783.97	95.11	....	13,803.68	14,682.76	18,268.02
Washington	11,548.98	5,144.99	17,073.09	874.92	....	34,641.98	2,971.67	289.04	....	16,532.27	19,792.98	14,849.00
Norfolk	68,628.69	8,815.36	104,931.68	2,201.93	....	184,577.66	870.88	10,289.99	....	100,540.45	111,701.32	72,876.34
Mare Island	105,415.37	24,869.68	142,933.03	.20	....	273,238.28	1,157.52	1,685.57	....	138,328.42	141,171.51	132,066.77
New London	56.24	....	....	....	....	56.24	....	....	....	....	....	56.24
Torpedo station	970.46	3,508.53	661.20	....	....	5,140.19	178.69	....	314.10	3,359.30	3,852.09	1,288.10
Training station	17,010.56	1,290.00	20,395.69	....	....	38,696.25	390.43	4,665.29	16,485.24	820.19	22,361.15	16,335.10
Annapolis	686.88	699.63	3,186.92	....	....	4,573.41	575.68	....	660.28	3,242.87	4,478.83	94.58
Key West	2,690.76	3,125.11	171.83	....	....	5,987.70	98.02	....	....	3,483.84	3,581.86	2,405.84
Total	548,370.12	485,827.69	371,839.82	14,532.52	132,577.98	1,553,148.13	18,266.13	78,895.77	114,420.12	744,717.16	956,299.18	596,848.95
Naval Academy, Annapolis.	5,916.64	64,358.97	197.08	.08	....	70,472.77	64,539.63	.08	....	527.37	65,067.08	5,405.69
Grand total	16,921,194.64	3,159,333.29	3,550,099.16	702,179.59	1,574,068.34	25,906,875.02	2,226,107.97	1,063,109.24	177,761.19	5,130,808.12	8,599,786.52	17,307,088.50

Recapitulation of Appendixes H and I.

Balance on hand June 30, 1889	$16, 486, 885. 24		
Balance on hand, clothing and small stores not included in last report	434, 309. 40		
		$16, 921, 194. 64	
Receipts:			
Purchased		3, 159, 333. 29	
Manufactured articles		1, 574, 068. 84	
Transfers		3, 550, 099. 16	
Stores revalued by Statutory Board		702, 179. 59	
			$25, 906, 875. 02
Expended:			
For use		2, 226, 107. 97	
Condemned, etc		1, 065, 109. 24	
Transferred		5, 130, 808. 12	
Sale, etc		177, 761. 19	
			8, 599, 786. 52
			17, 307, 088. 50
Clothing and small stores on hand June 30, 1890			487, 204. 19
Balance on hand June 30, 1890, exclusive of clothing and small stores			16, 819, 884. 31

NOTE.—Included in the balance of clothing and small stores on hand June 30, 1890, is the sum of $15,374.13, being balances on hand at the naval training and torpedo stations, and which appear in Appendixes F and G, under the head of ships, instead of shore stations.

APPENDIX J.

Statement of value of stores on board ships.

Bureaus.	Balance on hand July 1, 1889.	Receipts.	Total receipts.
Construction and Repair	$313, 284. 54	$215, 880. 21	$529, 164. 75
Steam Engineering	176, 798. 00	140, 951. 56	317, 749. 56
Ordnance	1, 918, 250. 54	1, 150, 694. 53	3, 068, 945. 07
Equipment and Recruiting	1, 226, 040. 70	997, 127. 06	2, 223, 167. 76
Navigation	101, 834. 20	24, 231. 36	126, 065. 56
Total	3, 736, 207. 98	2, 528, 884. 72	6, 265, 092. 70

Bureaus.	Expended to use, condemned, etc.	Transferred.	Total issues.	Balance on hand June 30, 1890.
Construction and Repair	$92, 694. 28	$102, 203. 15	$194, 897. 43	$334, 267. 32
Steam Engineering	85, 955. 63	37, 703. 00	123, 658. 63	194, 090. 93
Ordnance	69, 977. 78	440, 585. 77	510, 563. 55	2, 558, 381. 52
Equipment and Recruiting	489, 739. 97	356, 780. 80	846, 520. 77	1, 376, 646. 99
Navigation	10, 045. 19	116, 020. 37	126, 065. 56	....
Total	748, 412. 85	1, 053, 293. 09	1, 801, 705. 94	4, 463, 386. 76

Balance on hand July 1, 1889	$3, 736, 207. 98	
Received during year	2, 528, 884. 72	
		$6, 265, 092. 70
Expended	748, 412. 85	
Transferred	1, 053, 293. 09	
Balance on hand June 30, 1890	4, 463, 386. 76	
		6, 265, 092. 70

APPENDIX K.

Statement of sales at auction of condemned material pertaining to Bureau of Provisions and Clothing at navy-yards and stations during fiscal year ending June 30, 1890.

	Gross receipts.	Expenses.	Net proceeds.
Navy Yard, Norfolk, Va., Sept. 18, 1889:			
Clothing	$1,085.84	$47.64	$1,038.20
Small stores	31.40	1.38	30.02
Total	1,117.24	49.02	1,068.22
Navy Yard, New York, Feb. 25, 1890:			
Provisions	2,373.77	86.15	2,287.62
Clothing	17,589.44	638.37	16,951.07
Small stores	948.05	34.41	913.64
Contingent stores	168.50	6.12	162.38
Total	21,079.76	765.05	20,314.71
Navy Yard, Norfolk, Va., June 12, 1890:			
Provisions	193.74	18.06	175.68
Clothing	419.65	39.13	380.52
Small stores	13.45	1.25	12.20
Contingent stores	13.25	1.24	12.01
Total	640.09	59.68	580.41
Navy Yard, Washington, D. C., June 24, 1890:			
Clothing	176.83	5.41	171.42
Small stores	20.70	.63	20.07
Contingent stores	4.75	.15	4.60
Total	202.28	6.19	196.09

APPENDIX L.

Summary of open purchase requisitions and Bureau orders acted upon.

Yards and stations.	Bureaus.							Total.
	Yards and Docks.	Equipment and Recruiting.	Navigation.	Ordnance.	Construction and Repair.	Steam Engineering.	Provisions and Clothing.	
Portsmouth	60	34		5	92	42	19	252
Boston	113	290	39	34	57	41	37	611
Training Station		69	121	17	30	28	17	282
Torpedo Station		20	25	110	2	1	4	162
New London	52	9		6	8	11		86
New York	195	499	58	297	570	367	311	2,297
League Island	60	36	15	16	34	25	39	225
Washington	78	77	46	559	92	38	97	987
Annapolis		36	111	106	24	26	15	318
Norfolk	90	116	8	62	243	115	68	702
Port Royal	13	1			3	4		21
Key West	23	8	1		8	7	8	55
Pensacola	22	3		1	5	6	1	37
Mare Island	67	141	33	37	107	133	82	600
Miscellaneous	5	82	10	48	89	36	80	350
Naval Asylum	173							173
Bureau orders		38		80	60	94		272
Total	951	1,459	467	1,378	1,424	973	778	7,430

APPENDIX M.

Compilation, showing cost of maintaining all naval vessels in commission during year ending June 30, 1890.

Vessels.	Money.				Value of stores.						Repairs while in commission.	Totals.	Time in commission.
	Pay, amount of.	Rations, amount commuted.	Special credits: Honorable discharge money, outfits to apprentices, etc.	Incidental expenses: Postage, freight, pilotage, medical supplies, etc.	Bureau of Provisions and Clothing (provisions and contingent stores).	Bureau of Steam Engineering.	Bureau of Construction and Repair.	Bureau of Navigation.	Bureau of Ordnance.	Bureau of Equipment.			Mos.
Adams	$77,351.91	$9,806.70	$617.29	$6,957.24	$8,824.80	$1,759.64	$1,352.40	....	$2,987.99	$13,048.34	$59.20	$122,765.51	12
Albatross	40,641.10	5,884.20	....	9.81	1,493.60	....	....	....	....	....	....	48,028.71	12
Alert	43,082.76	5,784.40	120.00	1,140.18	3,242.17	2,192.69	568.93	$229.12	555.99	6,325.56	....	63,241.80	10
Alliance	49,152.51	4,925.40	306.28	1,653.48	5,120.10	2,895.66	2,002.00	2,191.48	711.39	7,990.59	....	76,948.80	9
Atlanta	133,746.89	15,150.00	499.20	221.87	15,580.34	7,240.58	3,485.14	137.85	4,947.58	29,267.63	5,578.34	215,855.42	12
Baltimore	75,389.49	8,174.80	41.50	915.54	6,722.79	1,392.85	619.20	....	2,197.09	10,240.04	304.38	105,997.68	7
Boston	132,775.46	15,074.10	483.00	978.87	16,341.15	4,043.67	2,174.48	92.37	2,835.97	22,187.34	9,016.39	206,002.80	12
Charleston	72,091.46	11,344.80	583.17	135.61	3,814.69	1,697.88	444.74	....	2,369.44	6,619.81	3,744.97	102,846.57	6
Chicago	194,804.08	32,301.00	1,050.90	1,938.30	13,696.02	6,203.14	3,967.38	523.30	3,936.39	25,847.79	25,570.47	309,838.77	12
Constellation	29,411.04	5,109.30	201.00	742.68	1,727.41	....	1,878.48	52.66	17.02	3,870.96	....	42,490.55	7
Dale (receiving ship)	58,403.73	9,262.10	8,255.68	212.56	1,366.09	20.82	19.56	....	136.90	3,359.60	1,933.21	82,970.25	12
Fish-Hawk	31,246.38	6,681.30	....	....	5.85	....	....	....	....	....	....	37,933.53	12
Despatch	36,923.82	5,508.00	....	664.53	1,762.48	1,160.78	1,089.09	261.04	273.54	4,995.98	597.33	53,236.59	12
Dolphin	62,357.34	8,193.30	634.54	886.81	3,239.27	2,960.70	2,188.94	35.85	2,045.50	14,358.84	7,458.35	104,359.44	12
Enterprise	64,665.66	8,220.00	153.00	1,474.98	4,998.52	2,163.83	1,836.49	359.16	2,409.74	12,552.24	....	98,833.62	11
Essex	14,825 16	1,487.10	75.00	7.85	1,127.78	226.88	27.30	....	88.82	729.82	....	18,095.71	3
Franklin (receiving-ship)	96,245.30	16,428.80	3,903.61	66.40	5,620.43	666.34	508.11	134.99	330.50	5,684.71	2,748.83	132,338.02	12
Galena	108,583.42	14,816.10	651.35	1,468.41	8,032.76	1,487.14	1,920.87	703.22	2,943.86	14.856.15	19,784.26	175,247.04	12
Independence (receiving-ship)	101,418.83	27,414.60	10,398.08	135.33	375.63	154.71	1,249.69	....	179.04	8,106.44	2,812.68	152,245.03	12
Iroquois	85,028.52	9,666.00	....	609.83	6,767.85	1,457.81	588.88	289.41	2,106.18	15,677.62	27,190.29	149,377.39	12
Jamestown	82,203.16	11,952.00	427.90	538.90	13,068.11	19.68	1,142.37	167.49	1,370.70	6,333.80	3,540.46	120,764.57	12
Kearsarge	90,373.17	10,245.90	784.14	535.27	9,895.96	924.66	710.27	31.97	2,393.10	12,287.39	2,451.68	130,632.91	12
Lancaster	28,912.27	2,873.90	....	198.81	3,337.65	431.80	527.56	292.42	474.07	2,301.12	....	38,849.60	3
Marion	86,513.53	10,594.20	15.27	504.86	6,676.82	1,437.67	897.15	180.92	2,653.09	11,823.64	....	121,297.15	10
Michigan	50,110.07	11,592.50	3,991.46	1,217.39	202.03	395.71	4,469.62	....	949.32	5,446.74	....	78,374.81	12
Minnesota (receiving-ship)	81,069.51	23,376.70	10,820.97	1,876.16	1,276.06	848.11	811.33	....	72.27	6,679.11	1,973.85	129,404.67	12
Mohican	92,391.87	11,428.20	180.00	2,108.55	12,110.82	2,483.34	2,087.69	373.78	3,231.09	9,708.41	9.05	136,121.25	12
Monocacy	62,304.17	8,706.30	518.91	2,985.07	4,542.44	1,941.63	3,961.42	98.41	1,325.35	12,724.21	357.77	99,545.68	12

Monongahela	45,451.55	6,176.70	14.15	2,618.44	2,217.34	48.27	675.09	137.93	52.15	4,391.70	2,508.23	64,291.55	12
New Hampshire (receiving-ship)	142,665.03	50,547.80	7,065.32	2,193.44	433.92	2,095.97	1,777.00	6,687.18	1,327.49	12,760.01	....	227,553.25	12
Nipsic	71,078.43	8,339.80	178.03	2,117.21	8,369.00	1,315.40	27,447.95	531.31	830.92	9,074.24	15.10	129,518.29	12
Omaha	138,005.73	19,400.70	925.17	1,782.03	8,287.00	2,787.28	4,270.50	318.57	3,598.40	18,408.51	61.20	198,535.99	12
Ossipee	31,968.44	3,241.50	8.91	306.38	3,433.66	707.04	381.79	140.24	700.44	4,372.60	....	45,264.90	6
Palos	33,732.67	4,267.50	46.86	1,655.92	1,231.13	6,283.06	1,172.87	160.82	159.46	4,636.07	9.28	53,855.64	12
Pensacola	160,128.66	20,721.90	1,145.45	962.56	18,508.63	3,299.95	1,469.79	992.31	2,064.33	22,720.72	43,839.27	275,853.57	12
Petrel	33,442.71	4,489.50	....	3.25	1,792.00	373.60	195.27	....	542.86	1,539.37	4,760.64	47,139.20	7
Pinta	43,734.27	8,956.20	315.90	2,258.51	481.96	1,899.47	454.13	....	104.04	8,704.86	16,525.71	83,435.05	12
Portsmouth	82,420.71	12,575.70	571.78	482.67	11,724.96	141.04	870.75	648.63	945.55	4,480.72	3,204.16	118,066.67	11
Ranger	67,045.20	15,013.80	771.76	227.29	469.47	1,687.17	1,666.33	28.09	77.14	13,132.63	19,101.47	119,220.35	12
Richmond	151,849.19	23,339.70	966.85	6,420.82	14,979.72	3,987.03	1,968.36	172.02	3,425.99	33,810.36	....	240,920.04	12
St. Louis (receiving-ship)	60,868.75	7,494.00	4,370.79	27.13	3,274.45	....	78.83	....	46.35	1,262.97	....	77,423.87	12
Swatara	102,787.90	11,922.00	311.64	1,587.51	10,483.66	2,982.48	3,392.46	267.06	2,496.51	16,995.42	....	153,226.64	12
Tallapoosa	73,704.59	9,621.30	117.25	2,127.24	8,273.72	2,075.93	2,078.43	1.47	2,381.50	16,307.13	750.00	117,438.56	12
Thetis	48,297.24	7,170.30	102.00	1,241.66	2,250.69	1,442.24	881.34	324.33	141.83	10,277.46	18,991.24	91,120.35	12
Vermont (receiving-ship)	235,619.15	43,840.80	26,692.04	189.55	12,510.33	1,132.26	797.63	103.81	387.28	6,376.77	2,509.37	330,108.99	12
Wabash (receiving-ship)	113,164.08	20,483.10	6,225.37	84.50	14,186.41	925.21	468.81	....	8.92	4,641.28	....	160,137.71	12
Yantic	60,688.48	7,812.80	317.70	195.94	5,237.95	2,179.43	609.24	....	5,538.87	9,075.57	19,002.69	110,158.87	12
Yorktown	89,340.68	12,773.70	279.11	426.10	7,126.58	4,615.40	3,332.38	....	2,882.56	16,891.12	10,171.31	147,838.94	12
Total	3,868,775.57	609,304.10	95,148.23	56,994.34	296,442.20	86,186.88	94,033.73	16,649.16	71,254.04	492,883.39	256,080.78	5,943,752.42	

APPENDIX N.

SCHEDULE OF PROPOSALS RECEIVED DURING FISCAL YEAR.

Proposals for supplies for Naval Home, Philadelphia, Pa., under Bureau advertisement dated June 3, 1889; *opened June* 26, 1889.

Class 11:	
Roller & Shoemaker *	$113.03
Paul J. Field	143.37
Class 12:	
Charles J. Field *	33.93
Paul J. Field	44.36
Class 13:	
Paul J. Field *	94.48
Class 16, A:	
Jacob Reed's Sons	4,492.50
Wanamaker & Brown *	4,465.00
Class 16, B:	
Jacob Reed's Sons *	2,908.00
Wanamaker & Brown	2,979.00
Class 16, C:	
H. D. Conner *	1,325.00
Terrence Woods	1,343.00
Class 18:	
Chas. J. Field *	14.00
Class 19:	
William F. Bernstein*	1,506.59
Class 20, A:	
Thomas McConnell	3,286.87
George B. Newton & Co. *	3,101.25
Leo J. Tierney	3,138.15
Class 21:	
Charles J. Field †	226.42
William Hodges & Co. †	119.37
Paul J. Field *	441.01
Class 22:	
Charles J. Field	22.20
Roller & Shoemaker *	17.94
Class 25:	
Charles J. Field *	116.32
Paul J. Field	172.50
Class 26:	
Brook, Oliphant & Co. *	220.00
Paul J. Field	252.00
Class 28:	
Charles T. Adams *	241.42
E. C. Rahme	262.80
Class 31:	
Charles J. Field *	10.00
Paul J. Field	11.00
Class 32:	
Brook, Oliphant & Co.*	43.85
Charles J. Field	50.15
Class 35:	
Elias Pohl *	508.50
Class 38:	
Charles J. Field *	9.89
Paul J. Field	12.00
Class 39:	
Charles J. Field *	15 00
Paul J. Field	17.50
Class 47:	
Chas. J. Field *	33.37
Paul J. Field	41.28

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* Accepted. † Informal.

Class 48:	
Roller & Shoemaker *	$42.00
Paul J. Field	50.50
Class 50:	
Roller & Shoemaker *	32.24
Paul J. Field	51.67
Class 52:	
Roller & Shoemaker *	402.90
Class 52, B:	
Roller & Shoemaker *	10.95
Paul J. Field	17.50
Class 52, C:	
Roller & Shoemaker	74.40
Paul J. Field *	63.60
Class 54, A:	
Daniel Snyder *	9,740.25
Thomas Bradley	9,881.50
L. Shuster Boraef	10,876.25
Class 54, A 2:	
Robert McKeown *	10,171.35
Class 54, B:	
W. W. Jones	2,405.00
George Baumann	2,960.00
George W. Wanklin *	1,995.00
Class 54, C:	
W. W. Jones *	199.50
Robert McKnight & Sons	259.50
Paul J. Field	237.70
Class 57:	
Paul J. Field *	138.00
Class 60:	
Joseph Hollard *	1,462.00
Class 61:	
Roller & Shoemaker *	16.02
Class 62:	
Chas. J. Field *	48.55
Paul J. Field	62.05
Class 63:	
Chas. J. Field *	23.52
Paul J. Field	24.00
Class 66:	
Chas. J. Field *	3.29
Paul J. Field	3.95
Class 68:	
Charles J. Field *	63.19
William Hodges & Co.†	26.00
Paul J. Field	89.46
Class 69:	
Charles J. Field *	20.89
Paul J. Field	21.50
Class 70:	
Chas. J. Field *	5.05
Paul J. Field	7.38
Class 71, A:	
Roller & Shoemaker	380.40
Robert Mc Keown *	336.25
Paul J. Field	373.50
Class 71, B:	
Chas. B. Rees, Son & Co.*‡	360.00
Knickerbocker Ice Company	360.00

Proposals for "annual supplies" for Navy Yard, Portsmouth, N. H., under Bureau advertisement dated June 3, 1889; opened June 27, 1889.

Class 13, A:	
John H. Broughton	$5.00
Class 13, B:	
John H. Broughton *	155.00

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* Accepted. † Informal. ‡ Decided by lot.

Class 13, C:	
Rowland A. Robbins*	$326.45
John H. Broughton	471.50
Class 13, D:	
John H. Broughton*	3.00
Class 20, A:	
David Duncan & Sons*	18,609.30
Samuel G. French	19,142.90
E. R. Dunham	19,946.75
Class 20, B:	
David Duncan & Sons	1,000.98
Samuel G. French*	972.84
Class 20, E:	
George A. Hammond*	532.00
Class 33, A:	
A. A. McCullough	1,430.00
Randall P. Barron*	1,073.00
Joseph W. Duryee	1,232.00
John H. Broughton	1,345.00
J. W. Gaskill & Sons	1,236.00
Class 35:	
A. A. McCullough	1,960.00
Randall P. Barron	1,838.00
Joseph W. Duryee	1,670.00
John H. Broughton	2,415.00
J. W. Gaskill & Sons*	1,646.00
Class 36, A:	
A. A. McCullough	3,000.00
C. J. Townsend	2,500.00
Ethridge & Brooks	5,000.00
R. P. Barron	2,700.00
Joseph W. Duryee	2,750.00
J. W. Gaskill & Sons*	2,150.00
Class 37, B:	
A. A. McCullough	510.00
C. J. Townsend	450.00
R. P. Barron	449.40
J. W. Duryee*	360.00
J. W. Gaskill & Sons	450.00
Class 37, B 2:	
A. A. McCullough*	150.00
R. P. Barron	200.00
Joseph W. Duryee	180.00
John H. Broughton	225.00
Class 37, G:	
A. A. McCullough	165.00
R. P. Barron	205.00
Joseph W. Duryee	325.00
John H. Broughton*	100.00
George A. Hammond	275.00
Class 37, H:	
R. P. Barron	134.60
Joseph W. Duryee*	89.00
Class 48:	
Ethridge & Brooks	60.00
Rowland A. Robbins*	28.80
Class 59:	
P. H. McNamee	834.34
R. A. Robbins	634.60
James W. Soper*	589.33
Class 61, A:	
R. A. Robbins*	58.49
Class 61, B:	
R. A. Robbins*	64.51
Class 61, C:	
R. A. Robbins*	102.00
Class 61, E:	
R. A. Robbins*	22.95

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* Accepted.

lass 61, F:	
R. A. Robbins*	$19.20
lass 61, H:	
R. A. Robbins*	32.25
lass 61, I:	
R. A. Robbins*	33.01
lass 61, L:	
R. A. Robbins*	15.45
lass 61, M:	
R. A. Robbins*	7.46
lass 61, N:	
R. A. Robbins*	9.48
lass 61, O:	
R. A. Robbins	15.80
James W. Soper*	15.46
lass 61, P:	
R. A. Robbins*	206.81
lass 61, Q:	
R. A. Robbins*	21.55
lass 71, G:	
George A. Hammond*	1,896.20

roposals for annual supplies for Navy-yard, Boston, Mass., under advertisement dated June 3, 1889; opened June 27, 1889.

lass 13, A:	
Rowland A. Robbins*	$343.20
lass 13, B:	
R. A. Robbins*	77.80
lass 13, C:	
R. A. Robbins*	559.20
lass 13, D:	
R. A. Robbins*	4.50
lass 13, E:	
A. A. McCullough*	858.00
R. A. Robbins	1,267.00
lass 13, G:	
A. A. McCullough	62.50
R. A. Robbins*	26.00
lass 20, A:	
David Duncan & Sons	19,645.39
Samuel G. French*	19,531.18
E. R. Dunham	19,911.30
lass 20, B:	
David Duncan & Sons*	10,701.90
Samuel G. French	11,486.20
E. R. Dunham	11,005.50
lass 20, C:	
David Duncan & Sons	437.50
R. A. Robbins*	223.50
lass 20, D:	
R. A. Robbins*	110.60
Thornton N. Motley	140.00
John Mullett	112.00
lass 20, E:	
John Mullett*	38.25
lass 48, A:	
Patrick H. McNamee	921.00
Ethridge & Brooks	834.00
R. A. Robbins	715.20
Putnam & Foley*	614.20
lass 59, A:	
P. H. McNamee	3,269.48
R. A. Robbins	3,052.18
T. N. Motley*	2,610.85
James W. Soper	2,635.73
Putnam & Foley	2,936.73

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* Accepted.

Class 59, B:	
P. H. McNamee	$883.00
Ethridge & Brooks	885.00
R. A. Robbins	759.00
James R. Michael	1,060.00
James W. Soper*	742.00
Class, 61, A:	
R. A. Robbins*	176.76
Class 61, B:	
R. A. Robbins*	91.10
Class 61, C:	
R. A. Robbins*	103.10
Class 61, E:	
R. A. Robbins*	64.90
Class 61, H:	
R. A. Robbins*	40.57
Class 61, I:	
R. A. Robbins*	66.67
Class 61, L:	
R. A. Robbins*	21.00
Class 61, M:	
James R. Michael*	9.18
Class 61, N:	
R. A. Robbins*	6.15
Class 61, O:	
R. A. Robbins	13.69
James R. Michael*	13.10
James W. Soper	19.89
Class 61, P:	
R. A. Robbins*	211.10
Class 61, Q:	
R. A. Robbins*	24.05
Class 71, A:	
John Mullett*	55.00
Class 71, C:	
John Mullett*	5.40
Class 71, G:	
R. A. Robbins	1,837.00
John Mullett*	1,773.15

Proposals for supplies for Torpedo Station, Newport, R. I., under Bureau advertisement dated June 3, 1889; opened June 27, 1889.

Class 20, A:	
David Duncan & Sons	$15,042.00
Samuel G. French*	13,984.40
E. R. Dunham	14,103.40
G. B. Reynolds & Co	14,742.00
Class 20, B:	
David Duncan & Sons*	97.75
G. B. Reynolds & Co	102.00
Class 61, A:	
R. A. Robbins*	49.39
Class 61, B:	
R. A. Robbins*	31.75
Class 61, C:	
R. A. Robbins*	44.00
Class 61, E:	
R. A. Robbins*	36.20
Class 61, H:	
R. A. Robbins*	29.43
Class 61, I:	
R. A. Robbins*	22.60
Class 61, L:	
R. A. Robbins*	9.52
Class 61, M:	
R. A. Robbins*	4.95
Class 61, N:	
R. A. Robbins*	4.48

Class 61, O:	
R. A. Robbins	$10.40
James W. Soper*	9.86
Class 61, P:	
R. A. Robbins*	83.49
Class 61, Q:	
R. A. Robbins*	53.70

Proposals for supplies for Navy-yard, New York, under Bureau advertisement, dated June 3, 1889; opened June 27, 1889.

Class 13, A:	
R. A. Robbins*	$8.00
Class 13, B:	
Ethridge & Brooks	115.00
R. A. Robbins*	54.00
Class 13, C:	
A. A. McCullough	152.50
Rowland A. Robbins*	141.50
Class 19, A:	
P. H. McNamee	4,158.00
R. A. Robbins*	3,528.00
Class 19, B:	
Ethridge & Brooks	275.00
R. A. Robbins*	97.90
Class 20, A:	
David Duncan & Sons	34,491.60
Samuel G. French	35,697.60
David S. Wells*	33,203.20
E. R. Dunham	35,585.80
Class 20, B:	
David Duncan & Co.*	3,019.36
Samuel G. French	3,109.76
R. P. Barron	3,317.68
E. R. Dunham	3,209.20
Class 20, D:	
Samuel G. French	395.00
C. J. Townsend	345.00
Ethridge & Brooks	500.00
T. N. Motley	362.50
John Moonan*	325.00
Class 20, E:	
Samuel G. French*	89.60
C. J. Townsend	106.40
T. N. Motley	95.20
Class 22:	
Wm. McDonagh & Co.*	169.25
P. H. McNamee	184.75
R. A. Robbins	177.81
James R. Michael	403.25
T. N. Motley	177.50
Class 33:	
A. A. McCullough	2,730.00
R. J. Neely†	2,717.00
Higgins Bros	2,270.00
Randall P. Barron	2,310.00
Joseph W. Duryee*	1,806.00
John McClave	2,264.00
Watson & Pittinger	1,890.00
Lewis H. Ross	1,856.00
J. W. Gaskill & Sons	2,292.00
Class 34:	
A. A. McCullough	3,450.00
R. J. Neely†	2,717.00
Higgins Bros‡	1,092.80
Randall P. Barron*	3,415.00
Joseph W. Duryee	4,540.00
John McClave	4,225.00

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* Accepted. † Informal. ‡ Rejected.

Class 34—Continued.	
Watson & Pittinger	$3,465.00
Lewis H. Ross	7,390.00
J. W. Gaskill & Sons	3,437.00
Class 35:	
A. A. McCullough	5,265.20
Higgins Bros	5,056.00
Randall P. Barron	5,052.50
Joseph W. Duryee*	4,273.00
John McClave	4,943.00
Watson & Pittinger	4,282.50
Lewis H. Ross	4,333.36
J. W. Gaskill & Sons	4,728.00
Class 36:	
A. A. McCullough	3,600.00
R. J. Neely †	2,900.00
Ethridge & Brooks	7,000.00
R. P. Barron	2,640.00
Joseph W. Duryee	3,900.00
J. W. Gaskill & Sons *	3,520.00
C. J. Townsend *	2,400.00
Class 37, A:	
A. A. McCullough	410.00
Higgins Bros	360.00
Ethridge & Brooks	600.00
R. P. Barron *	315.00
Jos. W. Duryee	340.00
John McClave	361.00
Watson & Pittinger	370.00
Lews H. Ross	328.00
Class 37, B:	
A. A. McCullough	600.00
R. J. Neely †	480.00
C. J. Townsend	480.00
Higgins Bros	420.00
R. P. Barron	496.00
Jos. W. Duryee	496.00
John McClave *	413.00
C. F. Hodgdon	478.40
Class 37, C:	
A. A. McCullough	500.00
R. J. Neely †	690.00
Higgins Bros *	490.00
Ethridge & Brooks	1,250.00
R. P. Barron	535.00
J. W. Duryee	550.00
John McClave	495.00
Watson & Pittinger	530.00
Lewis H. Ross	504.00
Class 37, F:	
A. A. McCullough	50.00
Joseph W. Duryee	150.00
John McClave	150.00
Watson & Pittinger *	50.00
Lewis H. Ross	75.00
Class 37, G:	
A. A. McCullough	647.50
R. P. Barron	737.50
Joseph W. Duryee	902.50
Lewis H. Ross*	605.00
Class 37, H:	
A. A. McCullough	4,510.00
Higgins Bros	2,655.50
R. P. Barron	2,675.50
J. W. Duryee	2,355.00
John McClave	2,789.00
Lewis H. Ross *	2,293.50

* Accepted. † Informal.

Class 37, H^3:	
A. A. McCullough	$300.00
R. J. Neely †	450.00
Higgins Bros	260.00
Randall P. Barron	340.00
J. W. Duryee *	255.00
John McClave	310.00
C. F. Hodgdon	309.00
Class 48, A:	
C. J. Townsend	140.00
Ethridge & Brooks	70.00
Wm. McDonagh	40.00
P. H. McNamee	45.00
R. A. Robbins *	34.00
Class 50, B:	
Patrick H. McNamee	19,140.00
Rowland A. Robbins	16,520.00
Manhattan Oil Company	16,115.00
William P. Feeney & Co.*	14,380.00
Class 50, D:	
Rowland A. Robbins *	28.50
Class 52, A:	
C. J. Townsend *	435.00
Class 52, B:	
Wm. McDonagh & Co	315.00
Patrick H. McNamee	350.00
Rowland A. Robbins	320.00
Manhattan Oil Company*	305.00
Class 52, H:	
P. H. McNamee	10,761.00
R. A. Robbins *	9,100.00
George W. Piper	9,435.00
Class 61, A:	
R. A. Robbins *	381.10
Class 61, B:	
R. A. Robbins *	278.10
Class 61, C:	
R. A. Robbins *	561.22
Class 61, E:	
R. A. Robbins*	259.41
Class 61, F:	
R. A. Robbins*	16.30
Class 61, H:	
R. A. Robbins*	119.91
Class 61, I:	
R. A. Robbins*	289.12
Class 61, L:	
R. A. Robbins*	53.25
Class 61, M:	
R. A. Robbins*	76.30
James R. Michael	77.31
Class 61, N:	
R. A. Robbins*	21.36
Class 61, O:	
R. A. Robbins	90.73
James R. Michael*	56.15
James W. Soper	84.03
Class 61, P:	
R. A. Robbins*	481.90
Class 61, Q:	
R. A. Robbins*	61.30
Class 71, A:	
R. A. Robbins*	16.00
John Moonan	25.00
Class 71, F:	
R. A. Robbins*	8.40

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* Accepted. † Informal.

Class 71, G:	
Edward R. Shipman	$2,575.55
Rowland A. Robbins	2,495.00
John Moonan*	2,245.00

Proposals for supplies for Navy-yard, League Island, Pa., under Bureau advertisement dated June 3, 1889; *opened June* 27, 1889.

Class 20, A:	
David Duncan & Son	$6,411.75
Samuel G. French*	5,992.30
Leo. J. Tierney	6,054.65
Thomas McConnell†	....
Patrick & Lipsett†	....
Class 20, B:	
David Duncan & Son*	103.00
Class 61, A:	
Magee Printing House*	103.59
Rowland A. Robbins	114.19
Class 61, B:	
Magee Printing House	19.[illegible]5
Rowland A. Robbins*	13.20
Class 61, C:	
Magee Printing House*	118.51
Rowland A. Robbins	115.45
Class 61, E:	
Magee Printing House*	39.88
R. A. Robbins	41.46
Class 61, H:	
Magee Printing House	30.91
Rowland A. Robbins*	23.19
Class 61, I:	
Magee Printing House	38.45
Rowland A. Robbins*	30.32
Class 61, L:	
Magee Printing House	19.66
Rowland A. Robbins*	16.57
Class 61, M:	
Magee Printing House	46.60
Rowland A. Robbins*	11.90
Class 61, N:	
Magee Printing House	12.64
Rowland A. Robbins*	10.86
Class 61, O:	
Magee Printing House*	11.80
Rowland A. Robbins	15.30
Class 61, P:	
Magee Printing House	198.35
Rowland A. Robbins*	97.44
Class 61, Q:	
Rowland A. Robbins*	3.94
Class 71, F:	
Paul J. Field*	147.00
Class 71, G:	
Paul J. Field	1,452.00
Robt McKnight & Sons*	1,255.55

Proposals for supplies for the Naval Academy, Annapolis, Md., under Bureau advertisement dated June 3, 1889; *opened June* 27, 1889.

Class 13, A:	
A. A. McCullough	$1,037.50
George M. Potee*	712.50
Class 20, A:	
David Duncan & Son*	4,116.75
John Miller	4,775.00
George Bogus	4,290.00

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* Accepted. † Informal.

Class 20, B:	
David Duncan & Son	$14,502.50
Johnson Brothers*	13,333.00
John Miller	17,000.00
Meredith, Winship & Co	13,481.00
Class 33:	
A. A. McCullough*	90.00
Class 34:	
A. A. McCullough*	214.50
Class 35:	
A. A. McCullough*	500.00
John Keely†	525.00
Class 36, A:	
A. A. McCullough*	9.00
Class 37, A:	
A. A. McCullough*	48.00
Class 37, B:	
A. A. McCullough*	40.00
Class 37, H:	
A. A. McCullough*	24.00
Class 61, A:	
R. A. Robbins*	59.70
Class 61, B:	
R. A. Robbins*	82.90
Class 61, C:	
R. A. Robbins*	68.40
Class 61, E:	
R. A. Robbins*	64.30
Class 61, F:	
R. A. Robbins*	7.90
Class 61, H:	
R. A. Robbins*	106.80
Class 61, I:	
R. A. Robbins*	48.39
Class 61, L:	
R. A. Robbins*	22.27
Class 61, M:	
R. A. Robbins*	21.21
Class 61, N:	
R. A. Robbins*	29.25
Class 61, O:	
R. A. Robbins	49.60
James W. Soper*	44.12
Class 61, P:	
R. A. Robbins*	143.27
Class 61, Q:	
R. A. Robbins*	43.20
Class 71, A:‡	
John Keely	3.75
Class 71, G:‡	
John Keely	948.00

Proposals for supplies for Navy Yard, Washington, D. C., under Bureau advertisement dated June 3, 1889; opened June 27, 1889.

Class 13, A:	
J. B. Kendall*	$80.00
Class 13, B:	
J. B. Kendall	285.00
Ethridge & Brooks	300.00
Rowland A. Robbins*	201.00
Class 13, C:	
J. B. Kendall*	3.00
Class 19, B:	
Rowland A. Robbins*	12.75
James R. Michael	13.25
Class 19, E:	
Rowland A. Robbins*	224.32
James R. Michael†	172.70

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* Accepted. † Informal. ‡ Not awarded.

Class 19, F:	
Patrick H. McNamee*	$670.00
Rowland A. Robbins	690.50
James R. Michael	691.66
Class 20, A:	
David Duncan & Son*	3,938.00
Samuel G. French	4,243.44
Johnson Brothers	4,059.60
A. R. Williams & Co	4,172.72
John Miller	4,067.00
Class 20, B:	
David Duncan & Son	13,895.00
Johnson Brothers	10,920.00
A. R. Williams & Co	12,390.00
John Miller	11,900.00
Meredith, Winship & Co.*	10,745.00
Stephenson Bros	11,900.00
Emanuel Statler	11,375.00
Class 20, C:	
David Duncan & Son	675.00
Johnson Bros	397.00
A. R. Williams & Co.*	395.00
John Miller	432.00
Stephenson & Brother	410.00
Class 20, D:	
Williams & Sons	1,700.00
Johnson Bros	1,645.00
C. J. Townsend	3,200.00
Stephenson & Brother* †	1,645.00
Class 20, E:	
J. B. Kendall	305.00
Johnson Bros.*†	274.50
C. J. Townsend	487.00
John F. Clarke	274.50
Class 32, D:	
J. B. Kendall	230.00
Somerset R. Waters*	183.47
P. H. McNamee	278.50
Class 33, A:	
A. A. McCullough	960.00
R. J. Neely†	1,125.00
Ethridge & Brooks	1,125.00
Randall P. Barron	820.00
Joseph W. Duryee*	795.00
J. W. Gaskill & Sons	895.00
Class 33, B:	
A. A. McCullough	1,070.16
R. J. Neely ‡	1,428.80
Randall P. Barron	1,010.16
Joseph W. Duryee	1,046.60
Lewis H. Ross*	1,002.54
J. W. Gaskill & Sons	1,179.48
Class 35:	
A. A. McCullough	17,900.00
Randall P. Barron	15,765.00
Joseph W. Duryee	15,070.00
Lewis H. Ross	17,100.00
J. W. Gaskill & Sons*	14,560.00
Class 37, C:	
A. A. McCullough*	400.00
R. J. Neely ‡	540.00
Ethridge & Brooks	1,000.00
Randall P. Barron	480.00
Joseph W. Duryee	600.00
Lewis H. Ross	580.00
J. W. Gaskill & Sons	440.00

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* Accepted. † Decided by lot. ‡ Informal.

Class 37, H:	
A. A. McCullough	$11,900.00
Ethridge & Brooks	24,050.00
Randall P. Barron†	998.00
Joseph W. Duryee*	8,948.00
Lewis H. Ross	9,596.62
J. W. Gaskill & Sons	8,970.00
Class 42, B:	
J. B. Kendall§	12,695.00
Ethridge & Brooks	13,300.00
T. C. Hill & Co.‡	3,975.00
Class 43:	
J. B. Kendall*	1,851.75
Patrick H. McNamee	2,690.90
Rowland A. Robbins	2,165.70
Class 50, B:	
Patrick H. McNamee	3,407.50
Rowland A. Robbins	2,947.50
William P. Feeney & Co.*	2,437.50
A. G. Belden & Co.‡	1,100.00
Stephenson Bros. & Co.‡	3,162.50
Manhattan Oil Company	2,750.00
Class 50, C:	
J. B. Kendall	105.50
Patrick H. McNamee	102.00
Rowland A. Robbins*	92.00
A. G. Belden & Co.‡	72.00
Stephenson Bros. & Co.‡	106.00
Manhattan Oil Company	106.00
Class 61, A:	
Rowland A. Robbins*	125.10
Class 61, B:	
Rowland A. Robbins*	27.50
Class 61, C:	
Rowland A. Robbins*	82.40
Class 61, E:	
Rowland A. Robbins*	67.58
Class 61, F:	
Rowland A. Robbins*	650.85
Philadelphia Blue Print Company‡	400.00
Class 61, H:	
Rowland A. Robbins*	214.59
Class 61, I:	
Rowland A. Robbins*	46.56
Class 61, L:	
Rowland A. Robbins*	28.30
Class 61, M:	
Rowland A. Robbins*	11.63
James R. Michael	40.50
Class 61, N:	
Rowland A. Robbin*	13.93
Class 61, O:	
Rowland A. Robbins*	26.26
James W. Soper	26.34
Class 61, P:	
Rowland A. Robbins*	157.25
Class 61, Q:	
Rowland A. Robbins*	33.60
Class 68, B:	
J. B. Kendall	366.50
C. J. Townsend	485.00
P. H. McNamee	400.00
Phœnix Manufacturing Corporation*	260.00
Rowland A. Robbins	382.50
The S. C. Forsaith Machine Company	452.50
J. A. Emerick & Co	520.00
James W. Soper	390.00

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* Accepted. † Withdrawn. ‡ Informal. § Accepted for $5,257.50.

Class 71, A:	
J. B. Kendall	$80.25
W. W. Galt & Co.†	56.75
Rowland A. Robbins*	67.10
Class 71, B:	
J. B. Kendall	240.00
Rowland A. Robbins	345.50
J. A. Emerick & Co.*	229.25
Class 71, C:	
J. B. Kendall	60.40
Rowland A. Robbins*	51.70
Class 71, D:	
J. B. Kendall*	183.75
C. J. Townsend	197.40
Patrick H. McNamee	199.50
Rowland A. Robbins	203.70
Class 71, F:	
J. B. Kendall	94.50
Rowland A. Robbins*	86.35
Class 71, G:	
Myers & Loving	1,525.98
W. W. Galt & Co	1,136.00
Walter F. Hewett*	961.74

Proposals for supplies for Navy-yard, Norfolk, Va., under Bureau advertisement dated June 3, 1889; *opened June* 27, 1889.

Class 13, B:	
A. A. McCullough†	$104.00
Ethridge & Brooks	200.00
Rowland A. Robbins	263.00
J. A. Emerick & Co.*	189.50
Class 13, C:	
A. A. McCullough*	356.50
Ethridge & Brooks	370.25
Rowland A. Robbins	435.25
Class 20, A:	
David Duncan & Son	12,585.75
Johnson Brothers*	11,319.50
Ethridge & Brooks	19,470.00
John Miller	14,236.25
Geo. W. Taylor & Co	11,745.50
Stephenson & Brother	13,197.50
Class 20, B:	
David Duncan & Son	1,745.00
George W. Taylor & Co	1,470.00
William Lamb & Co.*	1,400.00
Class 20, C:	
David Duncan & Son	310.50
A. A. McCullough	285.20
William Lamb & Co.*	230.00
Class 20, D:	
R. J. Neely	390.00
C. J. Townsend	740.00
John W. Oast & Bro.*	360.00
Class 20, E:	
A. A. McCullough	181.60
C. J. Townsend	283.75
Ethridge & Brooks*	158.79
John W. Oast & Bro	192.95
Class 22:	
R. J. Neely*	145.50
Ethridge & Brooks	161.50
Patrick H. McNamee	148.98
Rowland A. Robbins	159.60
James R. Michael	345.50

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* Accepted. † Informal.

Class 33, A:	
A. A. McCullough	$1,440.00
R. J. Neely	1,407.00
Ethridge & Brooks	1,320.00
Randall P. Barron* †	1,200.00
Joseph W. Duryee	1,272.00
Watson & Pittinger	1,200.00
J. W. Gaskill & Sons	1,560.00
Class 34:	
A. A. McCullough	3,120.00
R. J. Neely *	2,968.00
Ethridge & Brooks	4,800.00
Randall P. Barron	3,076.00
Joseph W. Duryee	3,512.00
J. W. Gaskill & Sons	3,568.00
Class 35:	
A. A. McCullough	1,970.00
R. J. Neely	2,238.00
Ethridge & Brooks	2,530.00
Randall P. Barron	1,986.50
Joseph W. Duryee	1,938.00
Watson & Pittinger	1,885.00
J. W. Gaskill & Sons *	1,867.00
Class 36, A:	
A. A. McCullough *	1,075.00
R. J. Neely	1,077.75
C. J. Townsend	1,690.00
Ethridge & Brooks	1,355.00
Randall P. Barron	1,337.50
Joseph W. Duryee	1,136.00
J. W. Gaskill & Sons	1,597.00
Class 36, B:	
A. A. McCullough	3,300.00
R. J. Neely *	1,980.00
C. J. Townsend	3,000.00
Ethridge & Brooks	4,500.00
Randall P. Barron	2,700.00
Joseph W. Duryee	3,300.00
J. W. Gaskill & Sons	2,580.00
Class 37, A:	
A. A. McCullough	340.00
R. J. Neely	362.50
Ethridge & Brooks	500.00
R. P. Barron*	267.50
Joseph W. Duryee	337.50
J. W. Gaskill & Sons	437.50
Class 37, B:	
A. A. McCullough*	570.00
R. J. Neely	660.00
C. J. Townsend	705.00
Randall P. Barron	534.00
J. W. Gaskill & Sons *	440.00
Class 37, G:	
A. A. McCullough*	337.50
R. J. Neely	575.00
Ethridge & Brooks	500.00
Randall P. Barron	935.00
J. W. Gaskill & Sons	375.00
Class 37, H:	
A. A. McCullough *	950.00
R. J. Neely	1,263.25
Ethridge & Brooks	2,142.00
Randall P. Barron	1,962.00
Class 61, A:	
Rowland A. Robbins *	177.95
Class 61, B:	
Rowland A. Robbins *	16.60

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* Accepted. † Decided by lot.

Class 61, C:	
Rowland A. Robbins*	$170.80
Class 61, E:	
Rowland A. Robbins*	38.55
Class 61, H:	
Rowland A. Robbins*	47.30
Class 61, I:	
Rowland A. Robbins*	65.40
Class 61, L:	
Rowland A. Robbins*	23.82
Class 61, M:	
Rowland A. Robbins*	13.60
James R. Michael	14.05
Class 61, N:	
Rowland A. Robbins*	8.50
Class 61, O:	
Rowland A. Robbins*	15.52
James R. Michael*	13.35
James W. Soper	24.95
Class 61, P:	
Rowland A. Robbins*	157.26
Class 61, Q:	
Rowland A. Robbins*	19.70
Class 71:	
Ethridge & Brooks	2,133.25
Evans & Grandy	1,654.35
J. T. Parker & Bro	1,674.70
Ambrose H. Lindsay*	1,616.50

Proposals for brick for Navy-yard, New York, under Bureau advertisement dated June 5, 1889; opened June 29, 1889.

380,000 Haverstraw brick (per M):	
Rowland A. Robbins	$7.84
Hobby & Doody*	7.25

Proposals for protection wall at League Island, under Bureau advertisement dated June 5, 1889; opened July 9, 1889.†

Daniel C. Fahey	$47.00
Berry & McFrederick	107.00
American Artificial Stone Pavement Company	118.00
T. P. Smart	135.00
American Dredging Company	174.00
Francis H. Smith	129.00
John Jameson	139.00
J. H. Hathaway & Co	145.00
Owen Patterson	85.55
J. E. Simpson	147.56

Proposals for cementing cellar and walls at Naval Home, Philadelphia, under Bureau advertisement dated June 17, 1889; opened July 9, 1889.

Daniel C. Fahey	per square foot..	$1.15
Vulcanite Paving Company	do	1.38
Charles H. Large*	do	.89
Owen Patterson	do	1.57
Warren-Ehert Company	do	1.65

Proposals for fresh beef, vegetables, etc., for Key West, Fla., under Bureau advertisement dated June 15, 1889; opened July 15, 1889.

5,000 pounds fresh beef (per pound):	
S. O. Johnson*	$0.11
5,000 pounds fresh vegetables (per pound):	
S. O. Johnson*	.05

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*Accepted. † No award made.

3,800 pounds fresh bread (per pound):	
S. O. Johnson*	$0.09
7,300 pounds ice (per pound):	
S. O. Johnson*	.01½

Proposals for supplies for Navy-yard, Mare Island, Cal., under advertisement dated June 3, 1889; opened July 19, 1889.

Class 13, B:	
James McCudden	$151.50
Aden Brothers	144.00
A. S. Carman	148.00
A. Powell*	140.00
Class 13, C:	
James McCudden	957.50
Aden Brothers	1,010.00
A. S. Carman	982.50
A. Powell *	911.25
Class 20, A:	
John Rosenfeld's Sons * †	34,300.00
Samuel G. French	41,740.00
M. W. Seawell & Co	40,950.00
David Duncan Sons	37,065.00
James McCudden	39,465.00
E. R. Dunham	36,699.00
Class 20, B:	
David Duncan & Son	21,052.50
James McCudden *	16,236.00
Aden Brothers	17,439.00
William Walker	17,439.00
Class 20, C:	
David Duncan & Sons	1,250.00
James McCudden * ‡	1,250.00
Aden Brothers	1,325.00
Willliam Walker	1,300.00
Class 20, D:	
James McCudden	2,311.00
Aden Brothers *	2,188.00
A. S. Carman	2,276.00
William Walker	2,279.00
A. Powell	2,203.00
Class 20, E:	
James McCudden	537.60
Aden Brothers	499.20
A. S. Carman	537.60
William Walker	576.00
A. Powell * ‡	499.20
Class 22:	
Whittier, Fuller & Co.*	35.40
Class 33:	
James McCudden *	1,950.00
A. S. Carman	2,105.00
William Walker	2,080.00
John P. Sheldon	2,080.00
A. Powell	2,015.00
J. F. Kennedy	2,340.00
Class 34:	
James McCudden *	760.00
A. S. Carman	780.00
William Walker	790.00
John P. Sheldon	800.00
A. Powell	800.00
J. F. Kennedy	800.00
Class 36:	
James McCudden	4,947.50
A. S. Carman *	4,772.50
William Walker	4,977.00

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* Accepted. † Accepted for $10,000, part of class eliminated. ‡ Awarded by lot.

Class 36—Continued.	
John P. Sheldon	$5,072.00
A. Powell	4,780.00
J. F. Kennedy	5,101.00
Class 37 A:	
James McCudden*	420.00
A. S. Carman	500.00
William Walker	480.00
John P. Sheldon	460.00
A. Powell	440.00
J. F. Kennedy	500.00
Class 37, B:	
James McCudden*	1,280.00
A. S. Carman	1,290.00
William Walker	1,295.00
John P. Sheldon	1,325.00
A. Powell	1,325.00
J. F. Kennedy	1,440.00
Class 37, H:	
James McCudden	6,050.00
A. S. Carman	6,220.00
William Walker	6,554.00
John P. Sheldon	6,380.00
J. F. Kennedy	6,140.00
A. Powell*	5,876.00
Class 48, A:	
Whittier, Fuller & Co	387.50
Yates & Co.*	384.00
Class 50, B:	
Whittier, Fuller & Co.*	2,129.00
Manhattan Oil Company	2,794.50
Yates & Co	2,327.00
Arctic Oil Works	2,798.50
Class 50, C:	
Manhattan Oil Company	35.50
Whittier, Fuller & Co.*	28.75
Yates & Co	29.25
Class 50, D:	
Manhattan Oil Company	19.50
Whittier, Fuller & Co.*	18.50
Yates & Co	20.00
Class 61, A:	
Eugene D. Croker	159.90
Rowland A. Robbins	137.45
Cunninham, Curtis & Welch	132.05
H. S. Crocker & Co	132.95
Dutton & Partridge	128.12
Le Count Brothers	131.75
Payot, Upham & Co	127.50
Lake & Co.*	95.75
Class 61, B:	
Eugene D. Croker	181.20
Rowland A. Robbins*	171.60
Cunninham, Curtis & Welch	316.90
H. S. Crocker & Co	300.98
Dutton & Partridge	306.00
Le Count Brothers	304.50
Lake & Co	304.50
Payot, Upham & Co	319.90
Class 61, C:	
Eugene D. Croker	590.88
Rowland A. Robbins	539.10
Cunninham, Curtis & Welch	618.50
H. S. Crocker & Co	659.35
Dutton & Partridge	618.75
Le Count Brothers	668.70
Lake & Co.*	506.25
Payot, Upham & Co	628.95

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* Accepted.

Class 61, E:	
Eugene D. Croker	$158.54
Rowland A. Robbins	121.04
Cunninham, Curtis & Welch	102.85
H. S. Crocker & Co	96.92
Dutton & Partridge	102.80
Le Count Brothers †	87.79
Lake & Co	131.22
Payot, Upham & Co. *	94.47
Class 61, F:	
Eugene D. Croker	109.60
Rowland A. Robbins	91.00
Cunninham, Curtis & Welch *	59.95
H. S. Crocker & Co	61.50
Dutton & Partridge	61.75
Le Count Brothers	71.85
Payot, Upham & Co	65.35
Class 61, G:	
Eugene D. Croker	19.25
Rowland A. Robbins	16.50
Cunninham, Curtis & Welch	22.00
H. S. Crocker & Co	18.15
Dutton & Partridge	27.50
Le Count Brothers	16.50
Lake & Co.*	13.75
Class 61, H:	
Eugene D. Croker	170.20
Rowland A. Robbins	166.47
Cunninham, Curtis & Welch	158.81
H. S. Crocker & Co	156.04
Dutton & Partridge *	132.34
Le Count Brothers	148.61
Lake & Co	167.80
Payot, Upham & Co	143.90
Class 61, I:	
Eugene D. Croker	138.18
Rowland A. Robbins	124.35
Cunninham, Curtis & Welch	119.50
H. S. Crocker & Co	123.60
Dutton & Partridge *	110.80
Le Count Brothers †	108.43
Lake & Co	127.50
Payot, Upham & Co	113.71
Class 61, L:	
Eugene D. Croker	84.89
Rowland A. Robbins	78.15
Cunninham, Curtis & Welch	77.98
H. S. Crocker & Co	77.64
Dutton & Partridge *	77.04
Le Count Brothers	80.00
Lake & Co	77.40
Payot, Upham & Co	78.35
Class 61, M:	
Eugene D. Croker	52.20
Rowland A. Robbins	42.80
Cunninham, Curtis & Welch	44.65
H. S. Crocker & Co	47.31
Dutton & Partridge*	41.33
Le Count Brothers †	40.66
Lake & Co	45.00
Payot, Upham & Co	44.58
Class 61, N:	
Eugene D. Croker	24.50
Rowland A. Robbins	19.80
Cunninham, Curtis & Welch	18.45
H. S. Crocker & Co	18.10
Dutton & Partridge*	17.11
Le Count Brothers	18.96

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† Informal. * Accepted.

Class 61, N—Continued.	
Lake & Co	$24.50
Payot, Upham & Co	18.47
Class 61, O:	
James W. Soper *	57.23
Eugene D. Croker	87.35
Rowland A. Robbins	72.80
Cunninbam, Curtis & Welch	73.31
H. S. Crocker & Co	65.95
Dutton & Partridge	66.39
Le Count Brothers	84.80
Lake & Co	90.85
Payot, Upham & Co	75.20
Class 61, P:	
Eugene D. Croker	723.01
Rowland A. Robbins *	602.82
Cunninbam, Curtis & Welch	744.72
H. S. Crocker & Co	845.04
Dutton & Partridge	772.70
Le Count Brothers	797.77
Lake & Co	695.75
Payot, Upham & Co	807.81
Class 61, Q:	
Eugene D. Croker	188.75
Rowland A. Robbins	177.70
Dutton & Partridge *	102.50
Le Count Brothers	102.10
Payot, Upham & Co	107.60
Class 71, A:	
Lake & Co *	81.00
Class 71, C:	
Lake & Co *	127.75
Class 71, D:	
Whittier, Fuller & Co	304.00
Rowland A. Robbins	396.80
Yates & Co *	336.00
Class 71, F:	
Lake & Co *	491.70
Class 71, G:	
Thomas McGrane †	2,472.00
James McCudden	3,765.00
Aden Brothers	4,077.50
A. Powell	3,857.50
Lake & Co.*	3,402.50

Proposals for provisions, clothing, and small stores for Navy-yard, New York, under Bureau advertisement dated July 9, 1889; opened August 2, 1889.

3,000 pounds corn-meal (per pound):	
Thurber, Whyland & Co	0.03\frac{33}{100}$
C. J. Townsend *	.02
Francis H. Leggett & Co	.03
J. B. Morrell	.03¼
Kemp, Day & Co	.03$\frac{2}{10}$
5,000 pounds oatmeal (per pound):	
Thurber, Whyland & Co	.04$\frac{85}{100}$
C. J. Townsend *	.04
Francis H. Leggett & Co	.04$\frac{11}{16}$
J. B. Morrell	.04¼
Kemp, Day & Co	.06¼
1,000 pounds rye flour (per pound):	
Thurber, Whyland & Co	.03$\frac{62}{100}$
C. J. Townsend *	.02
Francis H. Leggett & Co	.03½
J. B. Morrell	.03½
Kemp, Day & Co	.04½

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* Accepted. † Informal.

1,000 pounds hominy (per pound):	
Thurber, Whyland & Co	$\$0.03\frac{45}{100}$
C. J. Townsend *	.02
Francis H. Leggett & Co	$.03\frac{1}{8}$
J. B. Morrell	$.03\frac{1}{4}$
Kemp, Day & Co	$.04\frac{1}{2}$
1,000 pounds raisins (per pound):	
Thurber, Whyland & Co	.17
C. J. Townsend	.12
Francis H. Leggett & Co	.11
Kemp, Day & Co.*	$.09\frac{1}{2}$
1,000 pounds currant (per pound):	
Thurber, Whyland & Co	$.09\frac{34}{100}$
C. J. Townsend *	.05
Francis H. Leggett & Co	$.07\frac{1}{8}$
Kemp, Day & Co	$.06\frac{1}{4}$
1,000 pounds prunes (per pound):	
Thurber, Whyland & Co	$.08\frac{3}{4}$
C. J. Townsend *	.05
Francis H. Leggett & Co	$.07\frac{1}{8}$
Kemp, Day & Co	.06
2,000 pounds cocoa (per pound):	
Thurber, Whyland & Co.*	$.34\frac{90}{100}$
C. J. Townsend	.38
20,000 pounds pickles (per pound):	
F. Foehrenbach *	$.05\frac{9}{10}$
Rowland A. Robbins	$.06\frac{1}{4}$
Kemp, Day & Co	$.06\frac{3}{4}$
5,000 gallons beans (per gallon):	
A. S. Bigelow	$.30\frac{1}{2}$
Thurber, Whyland & Co*	$.28\frac{11}{100}$
Henry L. Hand	.30
C. J. Townsend	.29
Francis H. Leggett & Co	.32
Charles H. Mattlage	$.30\frac{1}{2}$
J. B. Morrell	.33
James R. Michael	$.33\frac{1}{4}$
Kemp, Day & Co	.33
2,000 pounds tomatoes (per pound):	
Thurber, Whyland & Co	$.04\frac{20}{100}$
C. J. Townsend *	$.03\frac{1}{2}$
Francis H. Leggett & Co	$.03\frac{60}{100}$
J. B. Morrell	$.03\frac{3}{4}$
Kemp, Day & Co	$.03\frac{85}{100}$
100,000 pounds green coffee (per pound):	
Thurber, Whyland & Co	$.19\frac{81}{100}$
C. J. Townsend	$.22\frac{1}{2}$
Francis H. Leggett & Co.*	$.19\frac{17}{100}$
50,000 pounds sugar (per pound):	
Thurber, Whyland & Co.*	$.08\frac{86}{100}$
C. J. Townsend	$.09\frac{9}{10}$
Francis H. Leggett & Co	$.08\frac{87}{100}$
James R. Michael	$.09\frac{24}{100}$
40,000 pounds canned vegetables (per pound):	
Thurber, Whyland & Co	$.07\frac{93}{100}$
C. J. Townsend	.08
Francis H. Leggett & Co.*	$.05\frac{93}{100}$
Kemp, Day & Co	$.05\frac{98}{100}$
75,000 pounds salt-water soap (per pound):	
Chas. S. Higgins	$.03\frac{33}{100}$
Rowland A. Robbins	$.03\frac{39}{100}$
C. J. Townsend	$.03\frac{9}{10}$
Albert Flagler	$.03\frac{55}{100}$
Anthony Van Haagen	$.03\frac{69}{100}$
Colgate & Co	$.03\frac{8}{10}$
Frank A. McKeone *	$.02\frac{97}{100}$
2,000 pocket handkerchiefs (each):	
Rowland A. Robbins *	$.06\frac{73}{100}$

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* Accepted.

2,000 pocket handkerchiefs (each)—Continued.	
C. J. Townsend	$0.94
James R. Michael	.09
P. H. McNulty	.08½
3,000 jack-knives (each): ‡	
W. T. Rockwell	.33
Albert Flagler	.37½
F. T. Witte Hardware Company	.37
James R. Michael	.37
1,000 scissors (each):	
F. T. Witte Hardware Company	.37
James R. Michael	.60
Alexis Wittie †	.25
P. H. McNulty *	.30
1,000 razors (each): ‡	
C. J. Townsend	.29
Albert Flagler	.39½
F. T. Wittie Hardware Company	.56
James R. Michael	.60
2,000 scrub brushes (each):	
W. R. Thompson *	.17$\frac{27}{100}$
Rowland A. Robbins	.19$\frac{2}{10}$
F. T. Witte Hardware Company	.43
James R. Michael	.22
Wm. A. Wheeler	.23$\frac{2}{10}$
P. H. McNulty	.17$\frac{23}{100}$
1,000 razor strops (each):	
J. R. Torrey & Co	.16¾
C. J. Townsend	.27
F. T. Witte Hardware Company*	.16
Albert Flagler	.19¼
James R. Michael	.25
Alex. Wittie	.23
P. H. McNulty	.21
Charles H. Pleasants	.19
100 dozen E buttons (per dozen):	
C. J. Townsend	.40
James R. Michael	.50
Horstmann Brothers	.35
Wm. F. Bernstine *	.29½
P. H. McNulty	.33$\frac{17}{100}$
500 combs (each):	
James R. Michael *	.06½
P. H. McNulty	.10
500 agate cups (each):	
W. R. Thompson	.46$\frac{11}{100}$
Rowland A. Robbins *	.43$\frac{2}{10}$
F. T. Witte Hardware Company	.44½
Albert Flagler	.44$\frac{2}{10}$
James R. Michael	.45
Wm. A. Wheeler	.45
P. H. McNulty	.45½
500 agate bowls (each):	
W. R. Thompson	.33$\frac{44}{100}$
Rowland A. Robbins *	.31$\frac{2}{10}$
F. T. Witte Hardware Company	.32½
Albert Flagler	.32$\frac{44}{100}$
James R. Michael	.33
Wm. A. Wheeler	.33
P. H. McNulty	.32½
400 agate plates (each):	
W. R. Thompson	.32$\frac{44}{100}$
Rowland A. Robbins *	.30$\frac{2}{10}$
F. T. Witte Hardware Company	.32
Albert Flagler	.31$\frac{44}{100}$
James R. Michael	.35
Wm. A. Wheeler	.32
P. H. McNulty	.31$\frac{17}{100}$

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*Accepted. † Informal. ‡ **Class not awarded.**

500 dozen ivory buttons (per dozen):	
Rowland A. Robbins	\$0.04$\frac{7}{10}$
C. J. Townsend	.52
Albert Flagler	.04$\frac{13}{100}$
Horstmann Brothers	.05
W. F. Bernstien*	.03$\frac{83}{100}$
P. H. McNulty	.04½
James R. Michael	.04½
500 dozen rubber buttons (per dozen):	
Rowland A. Robbins*	.25$\frac{4}{10}$
C. J. Townsend	.34
James R. Michael	.56¼
Horstmann Brothers	.30
P. H. McNulty	.27
40,000 yards cotton duck (per yard):	
Rowland A. Robbins	.11$\frac{43}{100}$
T. A. Ashburner	.12$\frac{35}{100}$
James R. Michael	.12½
William A. Wheeler*	.11
P. H. McNulty	12$\frac{67}{100}$
2,000 pairs calf shoes (per pair):	
Alexander McKnight	1.98
J. Freeman Shoe Company	1.97
John F. Thompson*	1.92½
10,000 pairs woolen socks (per pair):	
B. Y. Pippey & Co.*	.33¼
P. H. McNulty	.45
400 mattresses (each):	
W. R. Thompson	3.23
Rowland A. Robbins	3.23
J. W. W. Moyer*	3.16
W. F. Bernstien	3.19
Hartford Woven Wire Mattress Company	3.45
P. H. McNulty	3.50
1,000 blankets (each):	
C. J. Townsend*	2.27
B. Y. Pippey & Co	2.46
5,000 yards tan duck (per yard):	
Rowland A. Robbins	.19$\frac{83}{100}$
T. A. Ashburner	.23$\frac{87}{100}$
J. B. Morrell	.20$\frac{33}{100}$
William A. Wheeler*	.19
J. R. Michael	.27
P. H. McNulty	.22½
2,000 watch caps (each):	
C. J. Townsend	.52
B. Y. Pippey & Co.*	.49
Horstmann Brothers	.75
P. H. McNulty	.54
10,000 pairs cotton socks (per pair):	
B. Y. Pippey & Co.*	.15
James R. Michael	.17
P. H. McNulty	.16
20,000 pounds candles (per pound):	
Thurber, Whyland & Co.*	.09$\frac{16}{100}$
Peter Comstock	.10
Manhattan Oil Company	.09¼
Charles H. Pleasants	.13¼
Emery Candle Company	.09⅝

Proposals for coal, etc., for New London, Port Royal, Key West, and Pensacola, under Bureau advertisement July 9, 1889; opened August 2, 1889.

New London, Conn.—Class 20, A:	
Samuel G. French	\$584.00
F. H. Chappell & Co.*	500.00
David Duncan & Sons	525.00

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* Accepted.

New London, Conn.—Class 20, D:	
Samuel G. French	$30.00
F. H. Chappell & Co.*	24.00
Port Royal—Class 20, A:	
Wm. M. Montgomery	5,390.00
Samuel G. French	5,540.00
Alabama Coal Company	6,250.00
Cary & Co	5,230.00
David Duncan & Sons*	4,940.00
E. R. Dunham	5,770.00
Key West—Class 20, A:	
Wm. M. Montgomery*	6,140.00
Samuel G. French	6,840.00
Alabama Coal Company	7,000.00
Cary & Co	6,220.00
David Duncan & Sons	6,780.00
E. R. Dunham	6,770.00
Key West—Class 20, D:	
Samuel G. French*	120.00
Pensacola—Class 20, A:	
Wm. M. Montgomery *	6,424.20
Samuel G. French	7,217.60
Mobile Coal Company	7,825.00
Cary & Co	6,760.00
David Duncan & Sons	6,543.20
E. R. Dunham	7,196.80
Pensacola—Class 71, G:	
Fredrick Bauer	753.68
B. A. Philbert*	715.44
McKenzie, Oerting & Co	756.34

Proposals for provender Naval Academy, Annapolis, Md., under Bureau advertisement dated July 15, 1889; *opened August* 9, 1889.

Class 71, G:	
F. H. Ridout†	
John B. Flood	$860.00
Henry B. Myers*	796.50
John Kealy	863.00

Proposals for cement, stone, and timber for Navy-yard, New York, under Bureau advertisement dated July 30, 1889; *opened August* 22, 1889.

Class 13.—Cement, stone, and sand:	
Tomkins Cove Lime Company †	
A. A. McCullough	$5,455.00
Batjer & Meyerstein *	2,530.00
Francis Gordon Brown	2,701.50
Frank Sears †	1,560.00
Rowland A. Robbins	2,670.00
C. J. Townsend	2,677.50
Class 34.—White-oak piles:	
Joseph W. Duryee *	480.00
A. A. McCullough	500.00
Watson & Pittinger	560.00
C. J. Townsend	600.00
Class 36.—Yellow pine timber:	
Eppinger & Russell*	6,750.00
Joseph W. Duryee	7,830.00
John Kenney	8,500.00
John McClave	7,950.00
A. A. McCullough	9,144.00
Class 37.—Spruce piles:	
Joseph W. Duryee	2,099.50
John McClave	2,762.50
Beard & Kempland *	1,917.50
A. A. McCullough	2,925.00
Watson & Pittinger	2,197.00
C. J. Townsend	5,200.00

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* Accepted. † Informal.

Class 10.—Bolts:	
James W. Soper	$390.52
Charles Dusenbury	525.00
Manning, Maxwell & Moore *	390.00
Rowland A. Robbins	448.86
C. J. Townsend	430.45
Class 47.—Spikes:	
James W. Soper	112.05
Charles Dusenbury	123.75
Manning, Maxwell & Moore *	103.50
Rowland A. Robbins	124.70
C. J. Townsend	132.30
Class 49.—Nuts:	
James W. Soper	22.50
Charles Dusenbury	25.00
Manning, Maxwell & Moore *	19.50
Rowland A. Robbins	21.00
C. J. Townsend	23.75
Class 56.—Washers:	
James W. Soper	20.40
Charles Dusenbury	27.00
Manning, Maxwell & Moore *	17.40
Rowland A. Robbins	25.38
C. J. Townsend	27.00

Proposals for jack knives and razors, under Bureau advertisement dated August 12, 1889; *opened September* 4, 1889.

3,000 jack knives (each):	
W. F. Rockwell	$0.33
Callahan & Gartlan	.39
William A. Wheeler	.43
Alexis Wittie	.44½
James R. Michael *	.31
Albert Flagler	.36$\frac{9}{10}$
1,000 razors (each):	
William A. Walker	.54
Alexis Wittie	.44½
J. R. Torry Razor Co. *	.26
James R. Michael	.48
Albert Flagler	.39

Proposals for paints, brushes, iron, etc., under Bureau advertisement dated August 16, 1889; *opened September* 9, 1889.

Class 11.—Navy-yard, New York:	
E. J. Griffith *	$2.96
C. T. Reynolds	3.50
Alexander Keiller	4.20
Rowland A. Robbins	4.40
Toch Brothers	22.00
Wm. A. Wheeler	4.00
Class 48.—New York:	
E. J. Griffith & Co	82.88
C. T. Raynolds †	52.08
Alexander Keiller	58.24
Rowland A. Robbins	58.24
Toch Brothers	56.00
Charles H. Pleasants	58.24
William A. Wheeler *	56.00
Class 52.—New York:	
E. J. Griffith & Co	658.81
C. T. Raynolds & Co.	691.54
Alexander Keiller	811.10
C. J. Townsend †	
Rowland A. Robbins	677.72
Toch Brothers	615.58
Charles H. Pleasants *	611.08
Wm. A. Wheeler	691.85

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* Accepted. † Informal.

Class 71.—New York:	
C. T. Raynolds & Co	$30.00
Alexander Keiller	22.00
Rowland A. Robbins*	9.00
Toch Brothers	10.00
Chas. H. Pleasants	34.80
William A. Wheeler	30.00
Class 41.—Portsmouth:	
C. J. Townsend	284.97
Rowland A. Robbins	242.84
Wm. A. Wheeler*	185.85
Class 56.—Portsmouth:	
C. J. Townsend	40.25
Rowland A. Robbins	35.00
William A. Wheeler*	31.50

Proposals for pig-iron, Navy-yard, Mare Island, Cal., under Bureau advertisement dated September 5, 1889; opened September 28, 1889.

35 tons Thomas No. 2 (per ton):	
J. Macdonough & Co	$36.00
James McCudden*	35.00
19 $\frac{990}{2240}$ tons, Glengarnoch (per ton):	
J. Macdonough & Co	36.00
James McCudden*	35.00

Proposals for constructor's stores for Navy-yard, Washington, D. C., under Bureau advertisement dated September 11, 1889; opened October 8, 1889.

Class 11.—Brushes:	
J. B. Morrell & Co.*	$0.70
Rowland A. Robbins	1.20
Class 14.—Hammock duck:	
J. B. Morrell & Co	50.50
James W. Soper*	42.90
Rowland A. Robbins	61.00
Class 19.—Billiard cloth:	
J. B. Morrell & Co	171.88
Wm. A. Wheeler	118.00
Rowland A. Robbins*	96.25
Class 21.—Mirror:	
J. B. Morrell & Co.*	3.40
Wm. A. Wheeler	4.50
Rowland A. Robbins	5.90
Class 35.—White pine lumber:	
John Kenny	220.00
Libbey, Bittinger & Miller*	216.00
A. A. McCullough	248.00
W. W. McCullough	240.00
J. W. Gaskill & Sons	220.00
J. W. Duryee	240.00
Class 37.—Mahogany:	
John Kenney*	616.00
Libbey, Bittinger & Miller	740.00
A. A. McCullough	1,140.00
W. W. McCullough	850.00
J. W. Gaskill & Sons	620.00
J. W. Duryee	680.00
Class 33.—Morse drills:	
J. B. Kendall	14.75
J. B. Morrell & Co	13.73
Jas. W. Soper	13.41
W. A. Wheeler	19.20
Rowland A. Robbins	16.80
Chas. H. Pleasants*	13.34

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* Accepted.

Class 59.—Twine:	
J. B. Kendall	$12.00
J. B. Morrell & Co.*	8.80
Jas. W. Soper	9.50
W. A. Wheeler	14.00
Rowland A. Robbins	10.80
Class 63.—Wash basins:	
J. B. Kendall	32.50
J. B. Morrell & Co	35.50
Wm. A. Wheeler	33.00
Rowland A. Robbins	42.00
Chas. H. Pleasants*	26.80
Class 68.—Grindstones, etc.:	
J. B. Kendall	14.66
J. B. Morrell & Co	12.87
James W. Soper*	10.62
Wm. A. Wheeler	13.70
Rowland A. Robbins	15.80
Chas. H. Pleasants	11.90

Proposals for provisions for Navy-yard, New York, under Bureau advertisement dated September 13, 1889; opened October 8, 1889.

55,000 pounds wheat flour:		
James R. Michael*	per barrel	$6.60
F. H. Leggett & Co.*	per pound	.02$\frac{54}{100}$
115,000 pounds salt pork:		
J. B. Morrell & Co	per pound	.06$\frac{5}{8}$
Charles F. Mattlage* — in barrels		.05$\frac{785}{1000}$
Charles F. Mattlage* — in half barrels		.06$\frac{285}{1000}$
Armour & Co. — in barrels		.06$\frac{3}{4}$
Armour & Co. — in half barrels		.07
5,000 gallons beans (per gallon):		
Thurber, Whyland & Co*		.30$\frac{28}{100}$
J. B. Morrell & Co		.33$\frac{1}{4}$
Charles F. Mattlage		.33$\frac{1}{8}$
James R. Michael		.35
Kemp, Day & Co		.36$\frac{1}{2}$
F. H. Leggett & Co		.36$\frac{1}{4}$
45,000 pounds salt beef (per pound):		
J. B. Morrell & Co		.04$\frac{1}{8}$
Charles F. Mattlage* — in barrels		.03$\frac{45}{100}$
Charles F. Mattlage* — in half barrels		.04$\frac{35}{100}$
Armour & Co — in barrels		.04$\frac{1}{8}$
Armour & Co — in half barrels		.04$\frac{3}{4}$
25,000 pounds rice (per pound):		
Thurber, Whyland & Co		.05$\frac{81}{100}$
J. B. Morrell & Co		.06$\frac{3}{8}$
Dan Talmage's Sons		.06$\frac{65}{100}$
William T. Reed*		.05$\frac{78}{100}$
Francis H. Leggett & Co		.06$\frac{43}{100}$
10,000 pounds butter (per pound):		
Simpson, McIntyre & Co.*		.28
25,000 pounds roast beef (per pound):		
Thurber, Whyland & Co		.09$\frac{382}{1000}$
Charles F. Mattlage		08$\frac{4}{10}$
H. M. Anthony		.07$\frac{1}{2}$
Armour & Co		.07$\frac{1}{2}$
Francis H. Leggett & Co*		.06$\frac{77}{100}$
6,000 pounds canned mutton (per pound):		
Thurber, Whyland & Co		.08$\frac{65}{100}$
Charles F. Mattlage*		.08$\frac{7}{10}$
Francis H. Leggett & Co		.08$\frac{3}{8}$
3,000 pounds canned corned beef (per pound):		
Thurber, Whyland & Co		.09$\frac{4}{10}$
Henry M. Anthony		.10$\frac{3}{10}$
Charles F. Mattlage		.08$\frac{48}{100}$
Armour & Co		.10$\frac{3}{10}$
Francis Leggett & Co.*		.08$\frac{86}{100}$

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* Accepted.

3,000 pounds brawn (per pound):	
Thurber, Whyland & Co	\$0.10$\frac{75}{100}$
Charles F. Mattlage	.10$\frac{8}{100}$
Henry M. Anthony	.10$\frac{2}{10}$
Armour & Co	.10$\frac{2}{10}$
Francis H. Leggett & Co.*	.08$\frac{49}{100}$
25,000 pounds ham (per pound):	
Thurber, Whyland & Co	.14$\frac{218}{1000}$
Chas. F. Mattlage	.13$\frac{74}{100}$
Armour & Co	.19$\frac{75}{100}$
Francis H. Leggett & Co.*	.12$\frac{47}{100}$
10,000 pounds bacon (per pound):	
J. B. Morrell & Co	.10
Charles F. Mattlage*	.09$\frac{98}{100}$
Kemp, Day & Co	.11¼
Armour & Co	.13
Francis H. Leggett & Co	.11½
15,000 pounds sausage (per pound):	
Henry M. Anthony *	.09
Kemp, Day & Co	.13
F. H. Leggett & Co	09$\frac{22}{100}$
6,000 pounds fish (per pound):	
Chas. F. Mattlage	.09$\frac{98}{100}$
Kemp, Day & Co	.11¼
F. H. Leggett & Co	.09$\frac{87}{100}$
4,000 pounds tea (per pound):	
M. F. Powers	.22
J. B. Morrell & Co. *	.21$\frac{7}{10}$
Robert G. Thomas	.26
Westminster Abbey	.24
Francis H. Leggett & Co	.20$\frac{85}{100}$
150,000 pounds sugar (per pound):	
Thurber, Whyland & Co	.07$\frac{94}{100}$
Von Glahn Bros	.07$\frac{7}{10}$
James R. Michael	.07$\frac{7}{10}$
Wm. T. Reed*	.07$\frac{48}{100}$
Francis H. Leggett & Co	.07$\frac{62}{100}$
10,000 pounds pickles (per pound):	
F. Foehrenbach & Co.*	.07¾
Kemp, Day & Co	.08
2,500 gallons molasses (per gallon):	
Francis H. Leggett & Co.*	.23$\frac{13}{100}$
2,000 gallons vinegar (per gallon):	
F. Foehrenbach & Co.*	.14½

Proposals for plate and bar steel for monitor Terror, at Navy-yard, New York, under Bureau advertisement dated September 14, 1889; *opened October* 8, 1889.

121,971 pounds plates (per pound):	
Rowland A. Robbins	\$0.06$\frac{99}{100}$
Linden Steel Company *	.04½
W. H. Wallace & Co	.05

Proposals for clothing, small stores, etc., for Navy-yard, New York, under Bureau advertisement dated September 19, 1889; *opened October* 15, 1889.

10,000 yards trouser cloth (per yard):	
Wendell, Fay & Co	\$2.45½
B. Y. Pippey & Co	2.53
Sullivan, Vail & Co.*	2.44¾
10,000 yards bleached cotton duck (per yard):	
Rowland A. Robbins*	.13$\frac{64}{100}$
Joseph Wechsler	.16¼
20,000 yards unbleached cotton duck (per yard):	
Rowland A. Robbins*	.10$\frac{81}{100}$
Joseph Wechsler	.12¾
William A. Wheeler	.13

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*Accepted

4,000 pair calf-skin shoes (per pair):	
George F. Roedel	$2.28
Freeman Shoe Manufacturing Company*	1.79
Alex. C. McKnight	1.80
6,000 pairs woolen socks (per pair):	
Joseph Wechsler	.40
Henry C. Harper†	.26¾
B. Y. Pippey & Co.*	.34½
3,000 black silk neckerchiefs (each):	
Joseph Wechsler*	1.03
A. Flagler†	1.03½
L. H. Newberger & Co	1.45
1,300 mattresses (each):	
Joseph Wechsler	3.15
William F. Bernstein*	3.03
Wm. R. Thompson	3.22
J. W. W. Moyer	3.20
3,000 blankets (each):	
Joseph Wechsler	5.20
B. Y. Pippey & Co.*	2.54
3,000 watch caps (each):	
Joseph Wechsler	.60
Horstmann Bros. & Co*	.48
B. Y. Pippey & Co	.64
2,600 mattress covers (each):	
Rowland A. Robbins	.84
Joseph Wechsler*	.53
William F. Bernstein	$.63\frac{99}{100}$
J. B. Morrell & Co	.63
J. W. W. Moyer	.57
30,000 pounds salt-water soap (per pound):	
Rowland A. Robbins	$.03\frac{47}{100}$
Charles S. Higgins	$.03\frac{16}{100}$
Frank A. McKeone*	.03⅛
Albert Flagler	$.03\frac{17}{100}$
3,000 pieces white linen tape:	
Joseph Wechsler	.01⅛
J. B. Morrell & Co	.01⅕
James R. Michael*‡	.01⅛
Wm. A. Wheeler	.01⅞
5,000 spools cotton (per spool):	
Rowland A. Robbins	.03½
Joseph Wechsler*	.03⅛
Henry C. Harper	$.03\frac{46}{100}$
James R. Michael	$.03\frac{5}{12}$
William A. Wheeler	.04
5,000 spools sewing silk (per spool):	
Rowland A. Robbins	.04
John W. Pitkin	.04
Joseph Wechsler	.04
Henry C. Harper*	$.02\frac{7291}{10000}$
James R. Michael	$.04\frac{4}{10}$
William A. Wheeler	.03
1,000 cotton handkerchiefs (each):	
Rowland A. Robbins*	$.06\frac{73}{100}$
Joseph Wechsler	.09½
James R. Michael	.09
1,000 jack-knives (each):	
Rowland A. Robbins*	$.34\frac{97}{100}$
James R. Michael	.39
William A. Wheeler	.39
1,000 cakes shaving soap (per cake):	
J. R. Torrey & Co.*	.02½
Rowland A. Robbins	.06
A. Flagler	.04⅘
3,000 shoe-brushes, (each):	
Rowland A. Robbins	.24
Joseph Wechsler	$.22\frac{45}{100}$

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* Accepted. † Informal. ‡ Decided by lot.

3,000 shoe-brushes (each)—Continued.	
J. B. Morrell & Co.	$0.28
Wm. R. Thompson*	$.21\frac{28}{100}$
William A. Wheeler	.30
3,000 whisk brooms, (each):	
Rowland A. Robbins	.18
Joseph Wechsler	.18
Stephen Hoff	.18
Union Whisk and Novelty Company*	$.12\frac{1}{2}$
J. B. Morrell & Co	.19
Wm. R. Thompson	$.13\frac{47}{100}$
A. Flagler	$.14\frac{20}{100}$
Wm. A. Wheeler	.20
500 dozen E buttons (small) (per dozen) §	
Henry C. Harper	$.39\frac{1}{4}$
Joseph Wechsler	.35
Horstmann Bros. & Co	.33
Wm. F. Bernstein	$.30\frac{83}{100}$
A. Flagler	.32
500 coarse combs (each):	
John W. Pitkin	.05
Joseph Wechsler	.09
Henry C. Harper*	$.04\frac{98}{100}$
James R. Michael	$.07\frac{4}{10}$
1,000 forks (each):	
Rowland A. Robbins	.21
J. B. Morrell & Co	$.13\frac{48}{100}$
A. Flagler*	$.11\frac{9}{10}$
James R. Michael	$.14\frac{1}{2}$
Charles H. Pleasants	$.12\frac{64}{100}$
Wm. A. Wheeler	$.19\frac{3}{4}$
7,000 boxes blacking (per box):	
R. A. Robbins*	.03
John W. Pitkin	$.03\frac{1}{2}$
James R. Michael	.04
Charles H. Pleasants	$.05\frac{11}{12}$
Wm. A. Wheeler	.07
1,000 agate cups (each):	
Rowland A. Robbins*	$.42\frac{87}{100}$
J. B. Morrell & Co	.43
Wm. R. Thompson	$.43\frac{5}{10}$
A. Flagler	$.43\frac{7}{10}$
Jas. R. Michael	$.43\frac{88}{100}$
Wm. A. Wheeler	$.43\frac{66}{100}$
2,000 agate bowls (each):	
Rowland A. Robbins*	$.30\frac{87}{100}$
J. B. Morrell & Co	.31
Wm. R. Thompson	$.31\frac{5}{10}$
A. Flagler	$.31\frac{7}{10}$
Jas. R. Michael	$.31\frac{88}{100}$
Wm. A. Wheeler	$.31\frac{66}{100}$
1,500 agate plates (each):	
R. A. Robbins*	$.29\frac{97}{100}$
J. B. Morrell & Co	.30
Wm. R. Thompson	$.30\frac{5}{10}$
A. Flagler	$.30\frac{7}{10}$
Jas. R. Michael	$.30\frac{88}{100}$
William A. Wheeler	$.30\frac{66}{100}$
1,000 dozen ivory buttons (per dozen):	
Rowland A. Robbins	.06
Joseph Wechsler*	.05
Henry C. Harper	$.06\frac{78}{100}$
Wm. F. Bernstein	.07
500 dozen rubber buttons, large, (per dozen):	
Rowland A. Robbins	$.25\frac{7}{10}$
Joseph Wechsler	.24
Henry C. Harper	$.24\frac{78}{100}$
India Rubber Comb Company*	$.22\frac{1}{2}$

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* Accepted. §Class not awarded.

1,000 dozen rubber buttons, small, (per dozen):	
Rowland A. Robbins	0.04\frac{8}{10}$
Joseph Wechsler	.04½
Henry C. Harper	.04$\frac{35}{100}$
India Rubber Comb Company*	.04$\frac{1}{12}$
10,000 pounds candles (per pound):	
Thurber, Whyland & Co	.09$\frac{38}{100}$
Emery Candle Company*	.09$\frac{22}{100}$
A. Flagler	.11$\frac{45}{100}$
Manhattan Oil Company	.09$\frac{1}{10}$
Charles H. [illegible]asants	.11$\frac{24}{100}$
Peter Comstock	.11

Proposals for steel castings, Navy-yard, Washington, D. C., under Bureau advertisement dated September 21, 1889; *opened October* 15, 1889.

Castings for 6-inch central pivot carriage:	
Standard Steel Casting Company*	$30,100.00
Midvale Steel Company	47,300.00
Solid Steel Company	35,275.77
Additional for single test bars:	
Standard Steel Casting Company	3.00
Midvale Steel Company	3.00
Solid Steel Company	1.00

Proposals for material for quay wall for Navy-yard, Mare Island, California, under Bureau advertisement dated September 20, 1889, *opened October* 21, 1889.

Class 13.—Granite:	
A. S. Carman	$7,953.50
James McCudden*	7,487.50
A. Powell	8,237.50
I. L. Delanot	3,412.10
J. N. Taylor†	3,450.00
Abel Hosmer†	3,100.00
Class 36.—Piles, lumber, etc.:	
William Walker	10,027.92
A. S. Carman	9,104.16
James McCudden*	7,969.64
A. Powell	12,066.80
J. L. Kennedy	12,393.74
Class 37.—Redwood:	
William Walker	895.98
James McCudden*	447.99
A. Powell	477.85
J. L. Kennedy	447.99

Proposals for creosoting yellow pine lumber for Navy-yard, New York, under Bureau advertisement dated September 27, 1889; *opened October* 21, 1889.

Creosoting 180,000 feet (per M. feet):	
Eppinger & Russell	$23.00
Leigh Valley Creosoting Company	20.00
Samuel E. Haskin †	13.00

Proposal for steam-heating apparatus for Navy-yard, Washington, D. C., under Bureau advertisement dated October 4, 1889; *opened October* 28, 1889.

Thomas C. Basbor & Co	$10,900.00
Crook, Horner & Co	7,082.05
Bartlett, Heyward & Co	9,800.00
John Lyon	11,214.19
Samuel L. Pope & Co	7,390.00

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*Accepted. †Informal.

Proposals for "coal" for Navy-yard, New York, under Bureau advertisement dated October 4, 1889; *opened October* 28, 1889.

450 tons anthracite coal (per ton):	
David Duncan & Son*	$4.33
Samuel G. French	4.44
David S. Wells	4.48

Proposals for cement, sand, and lime, Navy-yard, Washington, under Bureau advertisement dated October 11, 1889; *opened November* 8, 18[illegible]

1,700 barrels cement (per barrel):	
I. G. & J. M. Waters*	$0.92
3,000 barrels sand (per barrel):	
H. S. McGlue†	.20
Ann Miller	.13
James T. Summers*	.11½
100 barrels lime (per barrel):	
J. G. & J. M. Waters*	.85

Proposals for coal, Navy-yard, Mare Island, California, under Bureau advertisement dated October 12, 1889; *opened November* 8, 1889.

1,000 tons anthracite coal (per ton):	
A. Powell	$17.00
James McCudden*	15.00
David Duncan & Son	17.24
Samuel G. French	18.24
John Rosenfelds Sons	15.40

Proposals for "Flannel and overcoat trimmings" Navy-yard, New York, under Bureau advertisement dated October 14, 1889; *opened November* 8, 1889.

60,000 yards ¾-flannel (per yard):	
Albert L. Fitzpatrick*	$1.03
B. Y. Pippey & Co	1.15
Henry T. Kent	1.09
Mark R. Wendell	1.18
Tefft, Weller & Co	1.03¼
Edward F. Church	1.24¼
11,000 yards lining flannel (per yard):	
H. H. Tobey	.65
B. Y. Pippey & Co	.58
Henry T. Kent	.62
Tefft, Weller & Co.*	.42¼
12,000 yards sateen twills:	
W. A. Wheeler	.07$\frac{9}{10}$
Rowland A. Robbins*	.06$\frac{92}{100}$
Henry C. Harper	.07⅛
Joseph Wechsler	.07$\frac{1}{10}$
7,000 yards canvas, lining (per yard):	
W. A. Wheeler	.10¼
James R. Michael	.09¾
Rowland A. Robbins	.10$\frac{87}{100}$
Joseph Wechsler	.09$\frac{44}{100}$
Tefft, Weller & Co	.08$\frac{88}{100}$
Beckermann & Co	.10
Henry C. Harper*	.08$\frac{83}{100}$
7,000 yards cheese-cloth (per yard):	
W. A. Wheeler	.02½
James R. Michael	.03$\frac{34}{100}$
Rowland A. Robbins	.02$\frac{4}{10}$
Joseph Wechsler*	.01$\frac{9}{10}$
Beckermann & Co	.01⅝

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*Accepted. †Informal.

1,200 gross rubber buttons (per gross): †	
Wm. A. Wheeler	$2.60
James R. Michael	2.59
Rowland A. Robbins	2.59
Henry C. Harper*	2.33¼
Joseph Wechsler	2.49$\frac{58}{100}$
Tefft, Weller & Co	2.39
Beckermann & Co	2.58
600 boxes B. H. twist (per box):	
W. A. Wheeler	.40
James R. Michael	.30
Henry C. Harper	.29¾
Joseph Wechsler*	.29$\frac{50}{100}$
Tefft, Weller & Co	.32¼
500 dozen spools cotton, black (per dozen):	
W. A. Wheeler	.47
James R. Michael*	.39
Henry C. Harper	.39$\frac{58}{100}$
Joseph Wechsler	.39$\frac{50}{100}$
Tefft, Weller & Co	.42$\frac{75}{100}$
Beckermann & Co	.40
Rowland A. Robbins	.43
1,200 dozen spools sewing silk (per dozen):	
W. A. Wheeler	.75
James R. Michael*	.59
Henry C. Harper	.64⅞
Joseph Wechsler	.85
Tefft, Weller & Co	.66
500 dozen spool cotton, white (per pound):	
W. A. Wheeler	.22
James R. Michael	.16
Rowland A. Robbins	.17$\frac{9}{10}$
Henry C. Harper	.18$\frac{87}{100}$
Joseph Wechsler*	.15
Beckermann & Co	.16
14,000 sheets wadding (per sheet):	
W. A. Wheeler	.02½
James R. Michael	.46
Rowland A. Robbins*	.01$\frac{98}{100}$
Henry C. Harper	.03$\frac{15}{100}$
Joseph Wechsler	.02$\frac{25}{100}$
Beckermann & Co	.03
1,000 pounds black linen thread (per pound):	
W. A. Wheeler	.97
James R. Michael	1.25
Rowland A. Robbins	1.04
Henry C. Harper*	.93$\frac{98}{100}$
Joseph Wechsler	1.09
Beckermann & Co	1.25
Tefft, Weller & Co	1.22

Proposals for railroad material for Navy-yard, New York, under Bureau advertisement dated October 14, 1889, opened November 8, 1889.

Class 36.—Y. P. Stringers:	
Eppinger & Russell	$1,579.20
Jos. W. Duryee	1,245.50
John McClave*	1,104.50
Class 37.—Chestnut ties:	
Joseph W. Duryee	240.00
John McClave*	220.00
Class 42.—Rails, etc.: ‡	
Rowland A. Robbins	11,163.01
Class 47.—Spikes: ‡	
Rowland A. Robbins	491.90

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* Accepted. † 600 gross awarded. ‡ No award.

Proposals for material for Galena's boilers, Navy-yard, New York, under Bureau advertisement dated October 17, 1889; opened November 12, 1889.

Class 17.—Safety valves:		
S. C. Forsaith Machine Co.*	Bid A	$101.25
	Bid B	95.25
Class 38.—Furnaces:		
Continental Iron Works †		3,360.00
Class 40.—Flat-iron (per pound):		
Thomas C. Burrows*		.03
Carnegie, Phipps & Co		.04
Class 43.—Bar steel (per pound):		
Thomas C. Burrows*		.03
Carnegie, Phipps & Co		.07
Class 44.—Steel plates (per pound):		
Carnegie, Phipps & Co.*		.07
Class 53.—Tubes (per pound):		
S. C. Forsaith Machine Company		1,705.41
George A. Taylor*		1,762.26
Whitely, Spowers & Co		2,045.37
Class 56.—C. G. Steel:		
Oliver Iron and Steel Company*		691.05

Proposals for castings for "Dunn Anchor" Navy-yard, Boston, under Bureau advertisement dated October 15, 1889, opened November 12, 1889.

J. W. Hoffman & Co	per pound	$0.15
Standard Steel Casting Company	do	.13¼
Solid Steel Company *	do	.13

Proposals for salt-water soap for Navy-yard, Mare Island, Cal., under Bureau advertisement dated October 21, 1889, opened November 21, 1889.

50,000 pounds S. W. soap (per pound):	
Alta Soap Company	$0.04
Otto Luhn & Co.*	.03$\frac{75}{100}$
A. Flager	.04$\frac{73}{100}$
Standard Soap Company	.04$\frac{6}{10}$

Proposals for engineer's stores for Navy-yard, Norfolk, Va., under Bureau advertisement dated October 23, 1889; opened November 21, 1889.

Class 17.—Valves, etc.:	
Benedict & Burnham Manufacturing Company †	
S. C. Forsaith Machine Company	$108.50
E. J. Griffith & Co	75.50
Wm. C. Codd*	67.50
Mayer & Co	84.00
James W. Soper	112.20
Crook, Horner & Co	109.00
Class 39.—Tobin Bronze:	
E. J. Griffith & Co	202.92
W. C. Codd	172.02
Ansonia Brass and Copper Company*	160.20
Mayer & Co	163.56
Class 43.—Tool steel:	
S. C. Forsaith Machine Company	68.60
E. J. Griffith & Co	58.80
Wm. C. Codd	44.10
Charles H. Pleasants	46.55
Mayer & Co*	36.75
Class 48.—Spirits turpentine:	
S. C. Forsaith Machine Company	24.75
E. J. Griffith & Co	26.10
Chas. H. Pleasants*	23.85
Mayer & Co	24.75

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*Accepted. † Informal.

Class 52.—White lead:	
S. C. Forsaith Machine Company	$132.50
E. J. Griffith & Co	110.00
Charles H. Pleasants*	106.61
Mayer & Co	112.25
Class 53.—Pipe tubes, etc.:	
S. C. Forsaith Machine Company	531.80
E. J. Griffith & Co	551.96
W. C. Codd*	463.66
Crook, Horner & Co	546.74
Mayer & Co	508.14
James W. Soper	508.00
Class 56.—Washers:	
S. C. Forsaith Machine Company	13.50
E. J. Griffith & Co	7.80
W. C. Codd*	7.50
Crook, Horner & Co	12.00
Mayer & Co	14.00

Proposals for hemp and chain iron for Navy-yard, Boston, Mass., under Bureau advertisement, dated October 26, 1889; opened November 21, 1889.

56,000 pounds manila hemp (per pound):	
Rowland A. Robbins*	0.12\frac{44}{100}$
Aaron D. Weld's Sons	Informal.
Lawrence Rope Works	.13
40,000 pounds chain iron (per pound): †	
J. W. Hoffman & Co	.03¼
Wm. A. Wheeler	.03$\frac{25}{100}$

Proposals for "coal," Honolulu, Hawaiian Island, under Bureau advertisement dated October 28, 1889; opened November 21, 1889.

1,000 tons anthracite coal (per ton):	
David Duncan & Son*	$17.45
Edward R. Dunham	22.00
Samuel G. French	17.84

Proposals for candles for Navy-yard, Mare Island, Cal., under Bureau advertisement dated October 28, 1889; opened November 26, 1889.

10,000 pounds candles (per pound):	
Frederick P. Reed	$0.11.3
Manhattan Oil Company*	.11

Proposals for crank-shaft for "Brooklyn" Navy-yard, Norfolk, under Bureau advertisement dated October 29, 1889; opened November 26, 1889.

Made of steel (per pound): †	
The Bethlehem Iron Company	$0.35

Proposals for slating, piping, fitting, etc., for Navy-yard, New York, under Bureau advertisement dated October 29, 1889; opened November 26, 1889.

Class 13.—Slate:	
Rowland A. Robbins*	$55.80
William A. Wheeler	58.75
Class 17.—Valves:	
Manning, Maxwell & Moore	137.52
J. B. Morrell & Co.*	129.42
Donegan & Swift	144.84
James W. Birkett	140.68
Forsaith Machine Company	183.72
Rowland A. Robbins	134.14
James W. Soper	143.31
William A. Wheeler	177.94

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* Accepted. † Class not awarded.

Class 31.—Lamp chimneys: ‡	
Charles H. Pleasants	$3.00
Manning, Maxwell & Moore	2.10
Rowland A. Robbins	4.44
Wm. A. Wheeler	7.50
Class 47.—Spikes:	
Charles H. Pleasants	55.00
Manning, Maxwell & Moore	55.00
J. B. Morrell & Co	62.50
Donegan & Swift	52.00
Rowland A. Robbins	84.00
James W. Soper *	51.80
William A. Wheeler	70.00
Class 52.—Vaseline:	
Charles H. Pleasants	25.60
Manning, Maxwell & Moore	30.00
J. B. Morrell & Co	28.00
Rowland A Robbins	27.40
James W. Soper *	24.50
Class 53.—Steam-pipe, etc.:	
Manning, Maxwell & Moore	312.02
J. B. Morrell & Co.*	302.03
Geo. A. Taylor†	
Donegan & Swift	313.17
James W. Birkett	314.96
Forsaith Machine Company	347.13
Rowland A. Robbins	332.39
James W. Soper	323.25
Wm. A. Wheeler	308.50
Class 57.—Springs:	
Rowland A. Robbins	14.80
William A. Wheeler*	13.00
Class 64.—Faucets: ‡	
J. B. Morrell & Co	2.94
George A. Taylor	1.74
Donegan & Swift	3.90
James W. Birkett	4.20
Rowland A. Robbins	3.18
James W. Soper	3.12
William A. Wheeler	3.90
Class 67.—Wrenches:	
Charles H. Pleasants	30.47
Manning, Maxwell & Moore	8.31
J. B. Morrell & Co	8.40
George A. Taylor	10.18
Donegan & Swift	8.79
Fonsaith Machine Co	10.05
R. A. Robbins	9.30
James W. Soper §	8.31
William A. Wheeler	9.30

Proposals for lumber, poles, and shores for Navy-yard, Norfolk, Va., under Bureau advertisement dated October 30, 1889; *opened November* 26, 1889.

Class 35.—White pine lumber:	
J. W. Gaskill & Sons*	$2,337.00
Joseph W. Duryee	2,387.00
Class 37.—Poles and shores:	
J. W. Gaskill & Sons*	1,068.00

Proposals for the Torpedo station, Newport, R. I., under Bureau advertisement dated November 8, 1889; *opened December* 3, 1889.

Class 11.—Paint brushes:	
Swinburn, Peckham & Co.*	$14.25
Rowland A. Robbins	19.00

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‡ Class not awarded. * Accepted. † Informal. § Decided by lot.

Class 13.—Bricks:	
Swinburn, Peckham & Co.*	$159.50
Class 35 and Class 37.—Clapboards:	
Swinburn, Peckham & Co.*	99.45
Class 52.—White lead:	
Swinburn, Peckham & Co.*	50.00
Rowland A. Robbins	54.25

Proposals for button-head bolts for the Navy-yard, New York, under Bureau advertisement dated November 8, 1889; opened December 3, 1889.

Class 10.—Bolts, etc.:	
Rowland A. Robbins*	$23.00
Wm. A. Wheeler	27.60
S. C. Forsaith Machine Co	37.50
Class 41.—Bunker iron, etc.:	
Rowland A. Robbins	467.77
Wm. A. Wheeler	488.25
S. C. Forsaith Machine Company*	456.75
Class 42.—Tee iron, etc.:	
Rowland A. Robbins*	143.93
Wm. A. Wheeler	164.54
S. C. Forsaith Machine Company	148.32

Proposals for "ordnance stores" for the Navy-yard, New York, under Bureau advertisement dated November 11, 1889; opened December 12, 1889.

Class 6:	
John L. Schultz	$146.00
J. B. Morrell & Co.*	70.00
J. W. Duryee	130.00
Rowland A. Robbins	108.00
Class 9:	
T. N. Motley	22.40
A. F. Brombacker & Co	24.00
James W. Soper*	14.40
A. Flagler	26.56
John L. Shultz	27.60
J. B. Morell & Co	22.80
E. J. Griffith & Co	26.40
Rowland A. Robbins	31.76
Class 10:	
Thornton N. Motley	145.32
A. F. Brombacker & Co	151.06
Donegan & Swift	154.30
A. Flagler	153.75
Wm. R. Thompson*	131.90
John L. Shultz	147.34
S. C. Forsaith Machine Company	152.53
J. B. Morrell & Co	146.95
Rowland A. Robbins	151.45
Wm. A. Wheeler	136.11
Class 11:	
Thornton N. Motley	71.77
Wm. R. Thompson	60.00
John L. Shultz	99.72
J. B. Morrell & Co.*	57.65
E. J. Griffith & Co	132.00
Rowland A. Robbins	60.80
Wm. A. Wheeler	79.63
Class 12:	
Thornton N. Motley	10.60
A. F. Brombacker & Co	11.51
Albert Flagler	9.50
Wm. R. Thompson	11.42
John L. Shultz	13.50

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* Accepted.

Class 12—Continued.	
J. B. Morrell & Co	$8.07
E. J. Griffith & Co	22.50
Rowland A. Robbins*	7.47
Class 13:	
J. B. Morrell & Co.*	26.85
Rowland A. Robbins	27.70
Class 14:	
Thornton N. Motley*	39.20
James W. Soper	45.00
John L. Schultz	45.00
J. B. Morrell & Co.*	39.05
Rowland A. Robbins	40.00
Class 17:	
Thornton N. Motley	35.10
Chas. Millar & Son	37.18
Donegan & Swift	37.56
James W, Soper	35.22
Albert Flagler*	34.56
John L. Shultz	45.62
S. C. Forsaith Machine Company	47.44
J. B. Morrell & Co	34.84
E. J. Griffith & Co	87.10
Rowland A. Robbins	36.16
Wm. A. Wheeler	48.50
Class 18:	
Thornton N. Motley*	337.50
A. F. Brombacher & Co	395.42
A. Flagler	456.25
William R. Thompson	402.62
S. C. Forsaith Machine Company	375.75
J. B. Morrell & Co	409.00
E. J. Griffith & Co	440.00
Rowland A. Robbins	404.50
William A. Wheeler	511.00
Class 19:	
Thornton N. Motley*	120.94
John L. Shultz	149.98
J. B. Morrell & Co	190.92
Rowland A. Robbins	164.74
Class 21:	
Wm. R. Thompson	17.50
J. B. Morrell & Co.*	16.50
E. J. Griffith & Co	57.00
Rowland A. Robbins	18.20
Class 25:	
Thornton N. Motley	93.20
A. F. Brombacher & Co	85.48
Ames Sword Co.†	
James W. Soper	113.20
Albert Flagler	73.04
John L. Schultz	79.00
J. B. Morrell & Co.*	56.60
E. J. Griffith & Co	63.40
Rowland A. Robbins	65.00
Class 26:	
Gutta Percha and Rubber Manufacturing Company	260.75
Thornton N. Motley	235.00
Wm. B. Brooke & Co	190.00
A. Flagler	179.75
John L. Schultz*	160.00
S. C. Forsaith Machine Company	292.50
J. B. Morrell & Co	188.88
Rowland A. Robbins	169.00
William A. Wheeler	203.50
Class 31:	
Wm. Porter's Sons	75.40
J. B. Morrell & Co	62.35

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*Accepted. †Informal.

Class 31—Continued.	
E. J. Griffith & Co	$62.20
Rowland A. Robbins *	59.70
Class 32:	
T. N. Motley	129.00
Page Belting Company	116.00
E. J. Brooks & Co	129.50
A. F. Brombacher & Co	108.00
Donegan & Swift	155.00
A. Flagler	145.00
Wm. R. Thompson	144.00
John L. Schultz *	106.50
J. B. Morrell & Co	131.50
E. J. Griffith & Co	142.00
Rowland A. Robbins	127.60
Wm. A. Wheeler	130.50
Class 35:	
John Kenney	491.50
Joseph W. Duryee *	471.75
Class 38:	
Thornton N. Motley*	26.32
A. F. Brombacher & Co	109.65
James W. Soper	88.15
J. M. Warren & Co	87.48
John L. Schultz	94.32
S. C. Forsaith Machine Company	88.87
J. B. Morrell & Co	100.94
E. J. Griffith & Co	90.70
Rowland A. Robbins	92.58
William A. Wheeler	129.35
Class 39:	
Thornton N. Motley	134.20
Donegan & Swift	183.25
J. B. Morrell & Co.*	128.70
E. J. Griffith & Co	203.25
Rowland A. Robbins	133.45
Wm. A. Wheeler	257.00
Class 40:	
Thornton N. Motley	75.00
James W. Soper	75.40
J. M. Warren & Co.*	74.25
John L. Schultz	93.75
J. B. Morrell & Co	81.50
E. J. Griffith & Co.	120.00
Rowland A. Robbins	76.00
Wm. A. Wheeler	106.00
Class 43:	
Thornton N. Motley	160.00
Donegan & Swift	108.50
John L. Schultz	109.76
J. B. Morrell & Co	103.90
Rowland A. Robbins	97.50
Wm. A. Wheeler *	94.50
Class 47:	
T. N. Motley	20.70
A. F. Brombacher & Co	19.65
James W. Soper	17.99
A. Flagler	20.25
Wm. R. Thompson	20.30
J. B. Morrell & Co.*	17.85
E. J. Griffith & Co	24.25
Rowland A. Robbins	19.60
Wm. A. Wheeler	24.25
Class 48:	
Thornton N. Motley	25.00
J. B. Morrell & Co.*	21.00
Rowland A. Robbins	21.40
Class 49:	
Thornton N. Motley	31.00

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* Accepted.

Class 49—Continued.	
A. F. Brombacher & Co	$31.46
Donegan & Swift	35.65
A. Flagler	32.90
Wm. R. Thompson	33.45
John L. Schultz	42.50
S. C. Forsaith Machine Company	39.12
J. B. Morrell & Co.*	30.91
Rowland A. Robbins	32.55
Wm. A. Wheeler	36.42
Class 50:	
Toch Bros. †	
Thornton N. Motley	353.00
Reed, Hall & Hewlett*	341.25
John L. Schultz	369.50
J. B. Morrell & Co	388.75
Wm. P. Feeney & Co	344.00
E. J. Griffith & Co. †	310.00
Rowland A. Robbins	363.00
Wm. A. Wheeler	424.50
Class 51:	
Gutta Percha and Rubber Manufacturing Company	185.00
Thornton N. Motley	153.75
Page Belting Company	177.95
Charles Millar & Sons	218.50
Donegan & Swift	175.00
James W. Soper	182.85
Wm. B. Brooke & Co	121.50
A. Flagler	147.63
S. C. Forsaith Machine Company	204.25
John L. Schultz*	116.25
J. B. Morrell & Co	133.13
Rowland A. Robbins	125.75
Wm. A. Wheeler	160.90
Class 52, A.:	
John L. Schultz*	235.00
Wm. A. Wheeler	240.00
Class 52, B:	
Toch Bros.†	
Thornton N. Motley	1,183.70
A. F. Brombacher & Co	1,214.05
Wm. R. Thompson	1,219.55
John L. Schultz	1,186.32
J. B. Morrell & Co*	1,138.39
E. J. Griffith & Co	1,305.50
Rowland A. Robbins	1,177.85
Wm. A. Wheeler	1,265.30
Class 56:	
Thornton N. Motley	14.80
A. F. Brombacher & Co	14.76
Donegan & Swift	21.85
Wm. R. Thompson	19.50
John L. Schultz	15.26
S. C. Forsaith Machine Company	77.90
J. B. Morrell & Co.*	13.80
E, J. Griffith & Co	27.80
Rowland A. Robbins	16.80
Wm. A. Wheeler	23.30
Class 57:	
A. F. Brombacher & Co.*	9.25
A. Flagler	11.40
J. B. Morrell & Co	10.20
E. J. Griffith & Co	35.75
Rowland A. Robbins	9.60
Class 58:	
Thornton N. Motley	30.15
A. F. Brombacher & Co.*	24.51
A. Flagler	25.33
J. B. Morrell & Co	24.97
E. J. Griffith & Co	33.30

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* Accepted. † Informal.

ne-line:

l & Co.*	$26.30
achine Co.*	1,482.69

for the Navy Yard, New York, under Bureau advertisement ber 15, 1889; opened December 12, 1889.

	$266.00
	264.00
	265.00
	284.00
	275.00
	309.00
	1,581.70
	1,462.25
	1,448.31
	1,876.30
	288.00
	234.00
nger	238.00
	234.50
ners	311.00
	285.00
A. Robbins	275.20
mbacher & Co	301.50
Schultz	278.87
W. Soper	382.88
m A. Wheeler	336.60
Morrell & Co*	269.80
land A. Robbins	148.50
A. F. Brombacher & Co	145.50
John L. Schultz	144.90
James W. Soper	141.90
William A. Wheeler	167.50
J. B. Morrell & Co*	140.00

Proposals for pipe machine for the Navy Yard, New York, under Bureau advertisement dated November 23, 1889; opened December 21, 1889.

Saunders pipe machine:

Rowland A. Robbins	$1,446.40
Manning, Maxwell & Moore*	1,347.00
S. C. Forsaith Machine Company	1,474.00
Hill, Clarke & Co†	

Proposals for hose for the New York Yary Nard, under Bureau advertisement dated November 25, 1889; opened December 21, 1889.

et leading hose:

w York Belting & Packing Company	1,488.00
wland A. Robbins	1,272.00
s M. Clapp & Co.*	1,008.00
Fire Hose Company	1,200.00
ville Lindsay	1,123.20
ter & llory	1,416.00
ng Company	1,428.00
k	1,248.00
nt.	1,200.00
Ca and Rubber Company	1,320.00
	864.00

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* Accepted. † Informal. ‡ Rejected.

Class 69:	
T. N. Motley*	$8.75
A. F. Brombacher & Co	9.93
Donegan & Swift	10.75
A. Flagler	11.00
J. B. Morrell & Co	9.00
E. J. Griffith & Co	15.00
Rowland A. Robbins	9.00
Class 70:	
Thornton N. Motley	35.00
A. Flagler	27.40
J. B. Morrell & Co	30.90
E. J. Griffith & Co. *	25.00
Rowland A. Robbins	53.60
Class 71:	
Thornton N. Motley *	220.50
John L. Schultz	255.50
J. B. Morrell & Co	303.50
Rowland A. Robbins	338.00
Wm. A. Wheeler	286.50

Proposals for equipment supplies for Navy-yard Mare Island, under Bureau advertisement dated November 12, 1889; opened December 12, 1889.

Class 4.—Washers: †	
Rowland A. Robbins	$4.00
Wm. B. Brooke	2.00
J. B. Morrell & Co	4.00
Louis E. Lake	4.75
Gutta-percha and Rubber Manufacturing Company	3.20
S. A. Forsaith Machine Company	7.50
Class 11.—Brushes:	
Louis E. Lake *	150.50
Class 13.—Lime:	
Wm. Walker	13.50
Louis E. Lake *	12.00
Class 14.—Canvas, cotton:	
Adam Grant *	1,438.33
Benj. Moore	2,344.49
Louis E. Lake	1,485.30
J. H. Lane & Co	
Class 15.—Boat chain:	
William Walker *	195.00
Louis E. Lake	270.00
Class 19.—Enameled cloth:	
Rowland A. Robbins	41.04
J. B. Morrell & Co	39.96
Louis E. Lake *	37.80
Class 20.—Coal:	
William Walker	12.50
Louis E. Lake *	7.50
Class 21.—Bath brick:	
William Walker	21.00
Louis E. Lake *	9.50
Class 26.—Hose: †	
Rowland A. Robbins	462.00
Wm. B. Brooke	372.82
A. C. Oliphant	402.15
Louis E. Lake	481.50
Gutta-percha and Rubber Manufacturing Company	431.55
S. C. Forsaith Machine Company	389.40
Class 48.—Tar:	
Louis E. Lake *	12.00
Class 59.—Cables, etc.:	
Rowland A. Robbins *	105.15
J. B. Morrell & Co	111.90
Louis E. Lake	168.50

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* Accepted. † Class not awarded.

Class 68.—Tape-line:	
J. B. Morrell & Co.*	$26.30
Class 18.—Seizing:	
S. C. Forsaith Machine Co.*	1,482.69

Proposals for lumber, etc., for the Navy Yard, New York, under Bureau advertisement dated November 15, 1889; opened December 12, 1889.

Class 35:	
Hobby & Doody	$266.00
J. W. Duryee*	264.00
John Kenney	265.00
Watson & Pittinger	284.00
John McClave	275.00
Higgins Brothers	309.00
Class 36:	
Hobby & Doody	1,581.70
J. W. Duryee	1,462.25
Watson & Pittinger*	1,448.31
John McClave	1,876.30
Class 37:	
Hobby & Doody	288.00
J. W. Duryee*	234.00
Watson & Pittinger	238.00
John McClave	234.50
Higgins Brothers	311.00
John Kenney	285.00
Class 39:	
Rowland A. Robbins	275.20
A. F. Brombacher & Co	301.50
John L. Schultz	278.87
James W. Soper	382.88
William A. Wheeler	336.60
J. B. Morrell & Co*	269.80
Class 47:	
Rowland A. Robbins	148.50
A. F. Brombacher & Co	145.50
John L. Schultz	144.90
James W. Soper	141.90
William A. Wheeler	167.50
J. B. Morrell & Co*	140.00

Proposals for pipe machine for the Navy Yard, New York, under Bureau advertisement dated November 23, 1889; opened December 21, 1889.

Saunders pipe machine:	
Rowland A. Robbins	$1,446.40
Manning, Maxwell & Moore*	1,347.00
S. C. Forsaith Machine Company	1,474.00
Hill, Clarke & Co†	

Proposals for hose for the New York Yavy Nard, under Bureau advertisement dated November 25, 1889; opened December 21, 1889.

2,400 feet leading hose:	
New York Belting & Packing Company	1,488.00
Rowland A. Robbins	1,272.00
Charles M. Clapp & Co.*	1,008.00
Fabric Fire Hose Company	1,200.00
Melville Lindsay	1,123.20
Reuter & Mallory	1,416.00
Boston Belting Company	1,428.00
Wm. B. Brook	1,248.00
A. C. Oliphant	1,200.00
New Jersey Car-Spring and Rubber Company	1,320.00
Charles Millar & Son‡	864.00

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* Accepted. † Informal. ‡ Rejected.

2,400 feet leading hose—Continued.	
J. J. Walton†	$960.00
W. A. Wheeler	1,175.28
Gutta-percha and Rubber Manufacturing Company	1,560.00
John L. Schultz	1,164.00
Daniel A. Woodhouse	1,176.00
S. C. Forsaith Machine Company	1,458.00
Eureka Fire Hose Company	1,920.00
The Amr. Fire Hose Mfg. Company	1,416.00
225 feet suction hose:	
New York Belting & Packing Company	290.00
Rowland & Robbins	211.50
Chas M. Clapp & Co *	263.25
Fabric Fire Hose Company	285.75
Melville Lindsay	261.00
Reuter & Mallory	371.00
Boston Belting Company	301.50
Wm. B. Brook	292.50
A. C. Oliphant	276.75
New Jersey Car-Spring and Rubber Company	281.25
Charles Millar & Sons‡	355.50
J. J. Walton†	299.25
W. A. Wheeler	202.48
Gutta-percha and Rubber Manufacturing Company	360.00
John L. Schultz	186.75
Daniel A. Woodhouse	331.75
S. C. Forsaith Machine Company	307.12
Eureka Fire Hose Company	265.00
The Am'r. Fire Hose Mfg. Company	258.75

Proposals for supplies for the Mare Island Navy Yard for quarter ending December 31, 1889, *under Bureau advertisement dated December* 16, 1889; *opened January* 15, 1890.

Class 10:	
Carolan & Co	$108.50
A. Flagler*	99.65
S. C. Forsaith Machine Company	144.25
Dunham, Carrigan & Hayden Co	104.50
Austin & Phelps	113.01
Class 11:	
Wm. P. Fuller, jr. *	93.83
Class 13:	
A. Powell *	1,329.75
Wm. Walker	1,458.00
James McCudden	1,355.50
A. S. Carman	1,356.00
Class 17:	
Carolan & Co	74.80
Hawley Bros. Hardware Company	66.66
A. Gallatin *	64.47
S. C. Forsaith Machine Company	85.62
Dunham, Carrigan & Hayden Co	66.25
Austin & Phelps	69.15
Class 18:	
Carolan & Co	325.60
Hawley Brothers Hardware Company *	205.65
Albert Gallatin	225.60
A. Powell	282.00
S. C. Forsaith Machine Company	253.50
Dunham, Carrigan & Hayden Co	212.10
Class 32:	
Stevenson Bros. & Co	933.35
Carolan & Co	611.65
Hawley Brothers Hardware Company *	567.85
Albert Gallatin	577.25
S. C. Forsaith Machine Company	802.90

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* Accepted. † Declined. ‡ Rejected.

Class 33:	
A. Powell **	$37.50
Wm. Walker	37.50
James McCudden	39.00
A. S. Carman	40.50
Class 34:	
A. Powell **	37.50
Wm. Walker	39.00
James McCudden	39.00
A. S. Carman	40.50
Class 35:	
A. Powell	620.00
Wm. Walker *	540.00
A. S. Carman	665.00
James McCudden	650.00
Class 36:	
A. Powell	2,728.62
Wm. Walker	5,640.93
James McCudden	2,728.62
A. S. Carman *	2,550.49
Class 37:	
A. Powell	160.00
Wm. Walker	205.00
James McCudden	160.00
A. S. Carman *	150.00
Class 38: †	
Hawley Brothers Hardware Company	408.18
Albert Gallatin	253.60
Dunham, Carrigan & Hayden Co	385.12
John L. Howe	370.16
Class 39:	
A. Gallatin *	432.80
Dunham, Carrigan & Hayden Co	477.60
Class 40:	
Carolan & Co	160.65
A. Gallatin *	154.50
Dunham, Carrigan & Hayden Co	159.45
Austin & Phelps	171.30
Class 41:	
A. Gallatin *	46.44
S. C. Forsaith Machine Company	60.93
Dunham, Carrigan & Hayden Co	63.92
Class 43:	
A. Gallatin *	112.00
S. C. Forsaith Machine Company	146.00
Dunham, Carrigan & Hayden Co	136.00
Austin & Phelps	120.00
Class 47:	
Carolan & Co	311.99
Hawley Brothers Hardware Company	276.58
A. Gallatin *	276.23
Dunham, Carrigan & Hayden	294.54
Class 51:	
Stevenson Bros. & Co	307.75
Carolan & Co	276.45
Albert Gallatin	182.10
S. C. Forsaith Machine Company *	135.35
Dunham, Carrigan & Hayden Co	193.00
Class 52, A:	
Wm. P. Fuller, jr *	168.75
Class 52, B:	
Wm. P. Fuller, jr *	220.00
Class 53:	
A. Gallatin	859.74
S. C. Forsaith Machine Company *	784.79
Dunham, Carrigan & Hayden Co	1,114.71
Austin & Phelps	927.49

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* Accepted. ** Decided by lot. † Class not awarded.

Class 58:	
Carolan & Co	$115.18
Hawley Brothers Hardware Company	103.82
A. Gallatin	99.78
Dunham, Carrigan & Hayden Co	107.02
Austin & Phelps*	89.82
Class 66:	
Carolan & Co	246.82
Hawley Bros. Hardware Company	213.78
James W. Soper*	185.82
A. Gallatin	194.79
Dunham, Carrigan & Hayden Co	216.60
Austin & Phelps	217.78
William P. Fuller, jr	192.94
Class 67:	
Carolan & Co	102.25
Hawley Brothers Hardware Company	112.18
A. Gallatin*	92.35
Dunham, Carrigan & Hayden Co	118.95
Class 68:	
Carolan & Co	162.75
Hawley Brothers Hardware Company*	117.09
A. Gallatin	122.90
Dunham, Carrigan & Hayden Co	147.40

Proposals for supplies for the Portsmouth and Boston Navy-Yards, for the quarter ending December 31, 1889, *under Bureau advertisement dated December* 19, 1889; *opened January* 15, 1890.

Class 11.—Boston:	
Rowland A. Robbins	$35.85
Gould & Cutler Corporation*	33.43
W. A. Wheeler	60.21
John Mullett	46.27
Class 17.—Boston:	
Putnam & Foley*	80.62
Wm. A. Wheeler	136.55
Class 37.—Boston:	
Geo. A. Hammond*	80.00
Class 40.—Boston:	
P. F. McDonald*	68.00
Wm. A. Wheeler	108.00
Class 47.—Boston:	
Bolles, Kimball & Wilde	60.14
Putnam & Foley*	58.29
Wm. A. Wheeler	80.61
Charles Millar & Sons	64.97
James W. Soper	67.56
Class 52, A.—Boston:	
Wm. A. Wheeler	90.35
Adams & Harrington	78.24
Gould & Cutler Corporation	69.84
Putnam & Foley	70.18
Charles H. Pleasants*	64.23
Class 52, B.—Boston:	
Wm. A. Wheeler	45.00
Charles H. Pleasants*	43.80
John Mullett	58.00
Class 53.—Boston:	
Rowland A. Robbins	157.32
Putnam & Foley	143.34
Wm. A. Wheeler	187.22
Charles Millar & Co.*	134.15
S. C. Forsaith Machine Company	142.64
Class 58.—Boston:	
Rowland A. Robbins	26.56
Bolles, Kimball & Wilde*	25.59

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* Accepted.

Class 58.—Boston—Continued.	
Putnam & Foley	$28.40
Wm. A. Wheeler	30.63
Jas. W. Soper	31.77
Class 13.—Portsmouth:	
Rowland A. Robbins*	104.00
Class 35.—Portsmouth:	
John H. Broughton*	75.00
Geo. A. Hammond	80.00
Class 38.—Portsmouth:	
Rowland A. Robbins	222.80
Wm. A. Wheeler	167.00
S. C. Forsaith Machine Company*	150.74
James W. Soper	216.00
Class 40.—Portsmouth:	
P. F. McDonald*	228.37
Wm. A. Wheeler	250.62
Class 41.—Portsmouth:	
Rowland A. Robbins*	52.55
P. F. McDonald	81.99
S. C. Forsaith Machine Company	57.01
James W. Soper	61.83
Class 43—Portsmouth:	
Rowland A. Robbins	73.00
P. F. McDonald	83.25
Midvale Steel Company*	44.00
Class 50.—Portsmouth:	
John Mullett*	375.00

Proposals for supplies for the Navy-Yard, New York, for the quarter ending December 31, 1889, *under Bureau advertisement December* 19, 1889; *opened January* 15, 1889.

Class 11:	
Rowland A. Robbins	$100.00
E. J. Griffith & Co	122.53
Wm. A. Wheeler*	95.25
J. B. Morrell & Co	106.40
Callahan, Reilly & Co	100.13
Class 17:	
Rowland A. Robbins*	71.55
E. J. Griffith & Co	78.50
S. C. Forsaith Machine Company	71.89
Donegan & Swift	85.26
Wm. A. Wheeler	77.18
Thornton N. Motley	114.25
J. B. Morrell & Co	76.03
Tissot & Schultz	76.10
James W. Soper	76.58
Class 25:	
Rowland A. Robbins	30.75
E. J. Griffith & Co.*	27.25
Wm. A. Wheeler	75.42
J. B. Morrell & Co	31.77
Tissot & Schultz	39.38
Class 26:	
Rowland A. Robbins*	28.50
S. C. Forsaith Machine Company	39.00
Henry M. Hubbard	41.50
Wm. B. Brooke	37.50
Charles Millar & Co	47.50
J. B. Morrell & Co	45.00
Tissot & Schultz	29.00
Class 32:	
Rowland A. Robbins	51.84
S. C. Forsaith Machine Company*	32.64
Wm. A. Wheeler	52.80
Stevenson Bros. & Co	43.20

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* Accepted.

Class 32—Continued.	
J. B. Morrell & Co	$38.40
Tissot & Schultz	48.00
Class 35:	
Rowland A. Robbins	244.80
Joseph W. Duryee	225.00
Watson & Pittinger	219.00
John Kenney*	201.35
Tissot & Schultz	292.45
Class 37:	
Rowland A. Robbins	109.60
Joseph W. Duryee	80.00
Watson & Pittinger*	67.00
John Kenney	74.00
Tissot & Schultz	99.96
Class 38, A:	
Rowland A. Robbins*	84.93
Class 38, B:	
Rowland A. Robbins	447.87
S. C. Forsaith Machine Company*	351.50
Henry M. Hubbard	463.03
Wm. A. Wheeler	493.05
J. B. Morrell & Co	443.59
Tissot & Schultz	451.24
Class 38, C:	
Rowland A. Robbins	333.20
E. J. Griffith & Co	332.00
S. C. Forsaith Machine Company	320.60
Wm. A. Wheeler	329.00
J. B. Morrell & Co	318.20
Tissot & Schultz*	317.40
James W. Soper	334.80
Class 39:	
Rowland A. Robbins	462.60
Donegan & Swift	451.90
Wm. A. Wheeler	480.30
J. B. Morrell & Co.*	440.90
Class 40:	
Rowland A. Robbins	828.91
Whitley, Spowers & Co.*	815.81
Henry M. Hubbard	876.13
J. M. Warren & Co	817.89
F. H. Woodruff	936.65
Wm. A. Wheeler	1,131.66
J. B. Morrell & Co	843.34
Tissot & Schultz	823.91
Class 41:	
Rowland A. Robbins	594.00
S. C. Forsaith Machine Company	550.00
Whitley, Spowers & Co	565.50
Henry M. Hubbard	541.50
F. H. Woodruff	662.50
Wm. A. Wheeler	595.00
J. B. Morrell & Co	582.00
Tissot & Schultz	573.75
James W. Soper*	532.90
Class 42:	
Rowland A. Robbins	274.91
S. C. Forsaith Machine Company	261.36
Whitley, Spowers & Co.*	242.00
Henry M. Hubbard	290.40
J. M. Warren & Co	280.72
F. H. Woodruff	290.40
Wm. A. Wheeler	377.52
J. B. Morrell & Co	266.20
Tissot & Schultz	251.68
Class 43:	
Rowland A. Robbins*	348.80
Park Bro. & Co., limited †	298.00

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*Accepted. † Informal.

Class 43—Continued.	
Thomas C. Burrows	$369.50
Wm. A. Wheeler	404.00
J. B. Morrell & Co	380.00
Tissot & Schultz	366.40
Class 47:	
Rowland A. Robbins	82.33
J. M. Warren & Co	77.94
Wm. A. Wheeler	117.60
Charles Millar & Son	84.05
J. B. Morrell & Co.*	71.96
Tissot & Schultz	78.26
James W. Soper	78.73
Class 52, A:	
Rowland A. Robbins	128.05
Adams & Harrigton	142.20
Wm. A. Wheeler	144.40
Thornton N. Motley	129.80
J. B. Morrell & Co.*	105.30
Tissot & Schultz	147.49
Charles H. Pleasants	113.09
Callahan, Reilly & Co	125.75
Class 52, B:	
Wm. A. Wheeler	87.50
Tissot & Schultz	92.75
Charles H. Pleasants *	76.65
Class 53:	
Rowland A. Robbins	260.35
S. C. Forsaith Machine Company	269.70
Whitely, Spowers & Co	242.00
Henry M. Hubbard	251.50
F. H. Woodruff	257.90
Wm. A. Wheeler	285.00
Thornton N. Motley	258.00
Charles Millar & Son *	231.87
J. B. Morrell & Co	248.50
Tissot & Schultz	234.75
James W. Soper	236.30
Class 58:	
Rowland A. Robbins	23.72
Henry M. Hubbard	24.06
J. M. Warren & Co	21.95
Wm. A. Wheeler	29.43
Thornton N. Motley	22.21
J. B. Morrell & Co.*	21.14
Tissot & Schultz	21.57
James W. Soper	22.63
Class 67:	
Rowland A. Robbins	185.97
S. C. Forsaith Machine Company*	144.70
John L. Howe	171.39
Wm. A. Wheeler	186.00
J. B. Morrell & Co	176.72
Class 68:	
Rowland A. Robbins *	347.23
Henry M. Hubbard	401.82
John L. Howe	363.37
J. M. Warren	385.61
W. A. Wheeler	437.65
J. B. Morrell	347.50
James W. Soper	403.76

Proposals for supplies for the Washington navy-yard for the quarter ending December 31, 1889, *under Bureau advertisement dated December* 19, 1889; *opened January* 15, 1890.

Class 10:	
S. C. Forsaith Machine Company	$432.00
J. B. Morrell & Co	266.20
Thornton N. Motley	268.30

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* Accepted.

Class 10—Continued.	
J. H. Sternbergh & Son	$293.46
Wm. A. Wheeler	300.00
Morton Reed & Co.*	247.40
J. B. Kendall	276.10
J. Edward Bates	253.00
W. C. Lewis & Co	263.00
Rowland A. Robbins	283.60
Whitely, Spowers & Co	263.80
E. J. Griffith & Co	273.00
Class 11:	
Shannahan, Reilly & Co	86.15
Rowland A. Robbins*	73.05
E. J. Griffith & Co	80.25
Class 13:	
W. W. McCullough	180.00
J. B. Kendall*	120.00
W. C. Lewis & Co	180.00
Class 14:	
Wm. D. Clarke & Co	157.50
James W. Soper	148.00
J. B. Morrell & Co	132.50
Wm. A. Wheeler	160.50
Tissot & Schultz	136.00
Rowland A. Robbins*	127.00
Class 22:	
W. W. McCullough	580.00
Charles Millar & Son	232.50
W. A. Wheeler	254.50
Tissot & Schultz	186.00
J. Edward Bates	198.40
W. C. Lewis & Co	210.00
Shannahan, Reilly & Co.*	181.00
Rowland A. Robbins	226.50
Class 32:	
Wm. C. Codd	1,520.60
Donegan & Swift	1,272.50
S. C. Forsaith Machine Company*	654.27
Stevenson Bros. & Co	2,846.50
Wm. B. Brooke	1,304.10
Page Belting Company	1,309.90
J. B. Morrell & Co	1,615.45
Heckner & Stine	1,451.95
Chas. Millar & Son	1,878.00
Thornton N. Motley	1,515.00
W. A. Wheeler	1,625.00
Tissot & Schultz	1,479.72
J. B. Kendall	1,373.50
Melville Lindsay	1,622.77
W. C. Lewis & Co	1,807.25
Rowland A. Robbins	1,416.00
Class 35:	
W. W. McCullough	225.00
W. T. Galleher & Bro.*	189.00
Class 38:	
Manning, Maxwell & Moore	1,048.67
S. E. Forsaith Machine Company	1,231.15
James W. Soper	1,184.40
John L. Schultz	1,110.75
W. A. Wheeler	1,223.00
Morton, Reed & Co.†	1,012.90
Rowland A. Robbins	1,120.60
E. J. Griffith & Co.*	1,021.00
Class 39:	
W. A. Wheeler*	284.20
W. C. Lewis & Co	324.90
Rowland A. Robbins	353.49

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*Accepted. † Informal.

Class 40:	
W. A. Wheeler	$238.50
Tissot & Schultz	190.80
J. B. Kendall*	163.25
Rowland A. Robbins	184.44
Class 43:	
Park Brothers & Co. { Bid A †	1,299.00
Park Brothers & Co. { Bid B †	583.14
Thomas C. Burrows	1,119.75
S. C. Forsaith Machine Company*	735.52
W. A. Wheeler	799.00
Tissot & Schultz	1,155.00
Morton, Reed & Co	800.00
J. B. Kendall	840.00
Midvale Steel Company	800.00
Rowland A. Robbins	1,113.00
Whitely, Spowers & Co	1,276.27
Class 49:	
Wm. C. Codd	444.00
S. C. Forsaith Machine Company	844.25
Wm. A. Wheeler*	309.62
Morton, Reed & Co	331.45
J. B. Kendall	847.34
J. Edward Bates	800.85
Rowland A. Robbins	473.00
E. J. Griffith & Co	431.80
Class 52 A:	
Chas. H. Pleasants*	109.00
Tissot & Schultz	137.50
Class 52 B:	
J. B. Morrell & Co	104.10
W. A. Walker	73.70
Chas. H. Pleasants*	50.50
Shannahan, Reilly & Co	136.90
Rowland A. Robbins	87.34
Class 58:	
James W. Soper	231.60
Thornton N. Motley*	175.51
W. A. Wheeler	204.00
Tissot & Schultz	193.32
Rowland A. Robbins	195.65
Class 67:	
Manning, Maxwell & Moore*	86.20
William C. Codd	99.70
Donegan & Swift	91.80
James W. Soper	97.90
J. B. Morrell & Co	107.50
Thornton N. Motley	99.25
William A. Wheeler	109.00
Rowland A. Robbins	103.50
Class 68:	
S. C. Forsaith Machine Company	958.10
James W. Soper	960.78
John L. Howe*	868.72
W. A. Wheeler	1,037.45
Rowland A. Robbins	954.55
E. J. Griffith & Co	887.28
Class 69:	
John L. Howe*	112.26
Wm. A. Wheeler	136.90
Rowland A. Robbins	124.00
Class 71:	
Wm. C. Codd	268.30
Donegan & Swift	Informal.
Stevenson Bros. & Co	353.60
Thornton N. Motley	254.00
Charles H. Pleasants	Informal.

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*Accepted. † Informal.

Class 71—Continued.	
J. B. Kendall	$271.45
W. C. Lewis & Co	Informal.
Rowland A. Robbins*	250.80
E. J. Griffith & Co	Informal.
Shannahan, Reilly & Co	Informal.

Proposals for supplies for the Pensacola navy-yard for the quarter ending December 31, 1889, *under Bureau advertisement dated December* 19, 1889; *opened January* 15, 1890.

Class 26.—Hose:	
Rowland A. Robbins	$580.00
E. J. Griffith & Co	975.00
Wm. A. Wheeler	600.00
S. C. Forsaith Machine Co	535.00
J. B. Morrell & Co	735.00
Daniel A. Woodhouse	570.00
Gutta Percha and Rubber Manufacturing Company	650.00
Wm. J. Brooke	570.00
C. McK. Seating	690.00
Gleason & Baily	845.00
Boston Belting Company	700.00
Page Belting Company	620.00
Tissot & Schultz	499.00
Melville Lindsay*	495.00

Proposals for supplies for the Norfolk navy-yard for the quarter ending December 31, 1889, *under Bureau advertisement dated December* 19, 1889; *opened January* 15, 1890.

Class 10:	
E. J. Griffith & Co	$124.55
Whitely, Spowers & Co	125.23
J. H. Sternbergh & Son	124.80
S. C. Forsaith Machine Company	128.65
Wm. A. Wheeler*	82.50
J. B. Morrell & Co	128.71
E. S. Meyers & Co	124.68
Thornton N. Motley	130.50
Class 17:	
Rowland A. Robbins	112.00
E. J. Griffith & Co	119.66
Wm. A. Wheeler	202.01
James W. Soper	120.06
S. C. Forsaith Machine Company*	33.05
Wm. C. Codd	107.95
E. S. Meyer & Co	120.98
Tissot & Schultz	151.12
Thornton N. Motley	53.00
Class 38:	
Rowland A. Robbins*	61.04
E. J. Griffith & Co	71.18
W. A. Wheeler	75.95
John L. Howe	65.67
Thornton N. Motley	83.56
Class 41:	
Rowland A. Robbins*	577.22
E. J. Griffith & Co	642.53
Whitely, Spowers & Co	605.99
James W. Soper	676.90
S. C. Forsaith Machine Company	692.27
W. A. Wheeler	658.91
E. S. Meyer & Co	767.62
Class 50:	
Rowland A. Robbins	122.00
E. J. Griffith & Co	105.50
Adams & Harrington	97.50
Westscott Bros	87.00

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*Accepted.

Class 50—Continued.	
Shannahan, Reilly & Co.*	$85.50
Wm. A. Wheeler	115.50
Charles H. Pleasants	103.00
Stevenson Bros. & Co	103.50
E. S. Meyer & Co	99.00
Thornton N. Motley	102.50
Class 52, A:	
Chas. H. Pleasants*	10.90
Tissot & Schultz	13.75
Class 52, B:	
Rowland A. Robbins	262.60
E. J. Griffith & Co	233.75
Adams & Harrington	262.65
Shannahan, Reilly & Co.*	213.65
W. A. Wheeler	275.59
Chas. H. Pleasants	223.96
Chas. M. Childs & Co.†	210.30
E. S. Meyer & Co	247.75
Tissot & Schultz	241.85
Thornton N. Motley	247.75
Class 67:	
Rowland A. Robbins*	21.70
E. J. Griffith & Co	24.00
Wm. C. Codd	27.50
E. S. Meyer & Co	22.25
Class 71:	
Rowland A. Robbins	24.40
E. J. Griffith & Co	59.00
James W. Soper	54.00
Chas. H. Pleasants*	57.00
Wm. C. Codd	24.00
E. S. Meyer & Co	60.00
Macan & Co	73.00

Proposals for material for new cruiser No. 7, navy-yard, New York, under Bureau advertisement dated December 18, 1889; *opened January*, 15, 1890.

Class 10:	
Rowland A. Robbins	$576.70
William A. Wheeler	597.50
Donegan & Swift	581.68
S. C. Forsaith Machine Company*	509.70
Tissot & Schultz	666.18
J. B. Morrell & Co	513.14
Class 11:	
Rowland A. Robbins	68.20
E. J. Griffith & Co	67.65
William A. Wheeler	48.35
Tissot & Shultz	87.60
J. B. Morrell & Co.*	38.07
Class 13:	
Rowland A. Robbins*	549.00
Class 35:	
Joseph W. Duryee*	1,090.00
Class 38:	
Rowland A. Robbins	489.60
William A. Wheeler	600.00
James A. Soper	527.52
Donegan & Swift	528.00
S. C. Forsaith Machine Company*	462.00
Tissot & Shultz	516.00
Class 48:	
E. J. Griffith & Co	73.50
William A. Wheeler	90.00
Charles H. Pleasants	76.50
Tissot & Shultz	74.98
C. M. Childs & Co	73.50
J. B. Morrell & Co.*	72.00

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*Accepted. †Informal.

Class 52:	
Rowland A. Robbins	$934.00
E. J. Griffith & Co	881.00
William A. Wheeler	1,018.20
Charles H. Pleasants	846.52
Tissot & Shultz	890.10
C. M. Childs & Co.*	821.10
J. B. Morrell & Co	894.80
Class 67:	
Rowland A. Robbins	19.40
E. J. Griffith & Co	26.50
James W. Soper	19.50
Donegan & Swift	18.50
J. B. Morrell & Co.*	17.80

Proposals for molding sand, sperm oil, hardware, etc., for the navy-yard, Mare Island, California, under Bureau advertisement dated December 20, 1889; opened January 22, 1890.

Class 13:	
A Powell*	$245.00
Class 50:	
Manhattan Oil Co	452.50
A. Gallatin	626.25
J. H. Knowles †	
Wm. P. Fuller, jr.*	376.00
Class Miscellaneous:	
A. Gallatin	280.25
Carolan & Co.*	242.25

Proposals for steel for the Mare Island navy-yard, under Bureau advertisement dated January 4, 1890; opened January 30, 1890.

Class 39.—Steel:	
Park Brothers	$352.10
Carolan & Co.*	153.53

Proposals for tools for plumber's shop, New York navy-yard, under Bureau advertisement dated January 2, 1890; opened January 30, 1890.

Class 68.—A:	
Tissot & Schultz	$144.14
A. Flagler	140.11
John L. Murray*	116.90
A. F. Brombacher	117.54
Rowland A. Robbins	136.30
S. C. Forsaith Machine Company	132.90
Class 68, B:	
Tissot & Schultz	99.50
A. Flagler	99.75
A. F. Brombacher*	68.40
Rowland A. Robbins	102.47
S. C. Forsaith Machine Company	93.50
Class 68, C:	
Tissot & Schultz	249.99
A. Flagler	256.80
A. F. Brombacher*	233.88
John L. Murray	274.00
Rowland A. Robbins	259.70
S. C. Forsaith Machine Company	264.00
Class 68, D:	
Tissot & Schultz	92.00
A. Flagler	93.05
A. F. Brombacher	92.40
John L. Murray*	72.00
Rowland A. Robbins	88.40
A. C. Forsaith Machine Company	81.00

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* Accepted. † Informal.

Class 68, E:	
Tissot & Schultz	$157.50
A. Flagler	157.80
A. F. Brombacher	165.00
Watson & Stillman	165.00
Rowland A. Robbins	167.00
S. C. Forsaith Machine Company *	92.00
Class 68, F:	
Tissot & Schultz *	247.36
A. Flagler	271.73
John L. Murray	390.41
A. F. Brombacher	314.32
Rowland A. Robbins	361.22
S. C. Forsaith Machine Company	253.32

Proposals for Steam-Engineering stores for U. S. S. Essex, navy-yard, New York, under Bureau advertisement dated January 6, 1890; *opened January* 30, 1890.

Class 13:	
Rowland A. Robbins*	$38.00
Class 38:	
H. W. Johns Manufacturing Company	3,369.60
Donegan & Swift	3,359.60
B. F. Sturtevant*	2,749.60
S. C. Forsaith Machine Company	3,472.55
R. A. Robbins	3,867.15
Class 51:	
J. L. Katzenstein*	220.00
R. A. Robbins	315.00

Proposals for lumber for the New York navy-nard under Bureau advertisement dated January 7, 1890; *opened January* 30, 1890.

Class 35:	
John McClave	$396.00
Rowland A. Robbins *	250.80
Watson & Pittinger	357.60
John Kenney	348.00
Joseph W. Duryee	310.80
R. G. Phelps	384.00

Proposals for leather belting, etc., New York yavy-yard, under Bureau advertisement dated January 8, 1890; *opened January* 30, 1890.

Class 50:	
Smith & Nichols	$120.00
Charles H. Pleasants *	98.00
Class 32:	
Tissot & Schultz	476.76
Wm. B. Brooke	452.69
Kellog, Ducey & McCauley	526.15
Page Belting Company	453.75
Marc M. Michael	613.45
Heim Belting Company *	399.30
Fred. W. C. Crane	501.37
Donegan & Swift	446.60
Melville Lindsay	429.54
Henry N. Hubbard	561.98
Fayerwether & Ladew	662.00
S. C. Forsaith Machine Company	400.73
Rowland A. Robbins	454.56
Wm. A. Wheeler	524.91
Class 71:	
Marc M. Michael	47.88
Rowland A. Robbins	25.20
Charles H. Pleasants *	21.00

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* Accepted.

Class 35:	
John Kenney	$51.25
John McClave	52.50
Watson & Pittinger	59.37
Jos. W. Duryee*	50.00
R. G. Phelps	80.00
Class 43:	
Tissot & Schultz	337.50
Marc M. Michael	378.00
Donegan & Swift	341.70
Park Brothers & Co.†	
Henry N. Hubbard	350.00
S. C. Forsaith Machine Company	342.90
Rowland A. Robbins*	326.70
William A. Wheeler	381.00

Proposals for Steam Engineering stores for the navy-yard, Mare Island under Bureau advertisement dated January 9, 1890; *opened January* 30, 1890.

Class 25:	
Carolan & Co.*	$9.00
Class 31:	
Park Brothers & Co.†	
Class 43:	
Park Brothers & Co	243.50
Carolan & Co.*	144.99
Class 50:	
Park Brothers & Co.†	
Class 51:	
Carolan & Co.*	52.50
Class 53:	
Carolan & Co.*	90.65
Class 56:	
Carolan & Co.*	7.50
Class 69:	
Carolan & Co.*	50.00

Proposals for coal for the New York navy-yard, under Bureau advertisement, dated January 10, 1890; *opened January* 30, 1890.

Class 20:	
David S. Wells	$21,964.00
David Duncan & Son	22,588.00
Edward R. Dunham*	20,848.00
Samuel G. French	21,728.00

Proposals for transportation of steam-launch from Portsmouth, N. H., to Key West, Fla., under advertisement dated January 27, 1890; *opened February* 10, 1890.

Henry W. McNeal	$395.00
Rowland A. Robbins*	357.00

Proposals for Steam Engineering stores for U. S. S. Charleston, navy-yard, Mare Island, Cal., under Bureau advertisement dated January 14, 1890; *opened February* 15, 1890.

Class 4:	
Albert Gallatin*	$7.63
Class 12;	
Albert Gallatin*	71.70
Hawley Bros. Hardware Company	83.80
Class 13:	
Hawley Bros. Hardware Company*	29.00
Class 17:	
W. T. Garratt & Co	217.75
Albert Gallatin*	199.59
S. C. Forsaith Machine Company	244.73

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*Accepted. †Informal.

Class 18:	
Albert Gallatin †	$60.80
Hawley Bros. Hardware Company	60.80
Class 25:	
Albert Gallatin	13.60
Hawley Bros. Hardware Company*	12.42
Class 31:	
Albert Gallatin*	356.60
Class 32:	
Albert Gallatin*	8.60
Hawley Bros. Hardware Company	35.50
Class 38:	
Albert Gallatin	273.85
Hawley Bros. Hardware Company	223.80
S. C. Forsaith Machine Company*	202.75
Class 39:	
W. T. Garratt & Co	Informal.
Albert Gallatin*	195.97
Class 41:	
Albert Gallatin*	6.89
Class 43:	
Albert Gallatin*	37.56
S. C. Forsaith Machine Company	44.20
Class 50:	
Albert Gallatin	235.00
Chas. H. Pleasants	231.08
H. B. Willis*	213.00
Class 51:	
Albert Gallatin*	228.73
Class 52:	
Chas. H. Pleasants*	292.08
Class 53:	
W. T. Garratt & Co*	395.58
Albert Gallatin	485.91
Class 64:	
Albert Gallatin	16.55
Hawley Bros. Hardware Company*	15.05
Class 65:	
Albert Gallatin*	36.95
Hawley Bros. Hardware Company	40.10
Class 67:	
Albert Gallatin*	141.47
Hawley Bros. Hardware Company	180.47
Class 68:	
Albert Gallatin*	254.25
Hawley Bros. Hardware Company	282.41
S. C. Forsaith Machine Company	284.65
Class 69:	
Albert Gallatin*	82.00
Class 70:	
Hawley Bros. Hardware Company*	1.50
Class 32:	
Hawley Bros. Hardware Company	221.95
S. C. Forsaith Machine Company*	209.30

Proposals for Steam Engineering stores for the Portsmouth navy-yard, under Bureau advertisement dated January 15, 1890; *opened February* 15, 1890.

Class 41:	
S. C. Forsaith Machine Company*	$281.53
Wm. A. Wheeler	509.25
Rider & Cotton	307.33
Class 43:	
Rowland A. Robbins	507.95
S. C. Forsaith Machine Company	461.15
Thomas C. Burrows*	385.02
William A. Wheeler	702.73
Rider & Cotton	399.42

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*Accepted. † Decided by lot.

Class 56:	
S. C. Forsaith Machine Company*	$5.60
Rider & Cotton	6.00

Proposals for Equipment Supplies for the Boston navy-yard, under Bureau advertisement dated January 13, 1890; *opened February* 15, 1890.

Class 15:	
S. C. Forsaith Machine Company*	$208.00
Putnam & Foley	251.87
J. B. Morrell & Co	253.50
Class 20:	
John Mullett	182.70
Boston Gas-Light Company*	163.38
Class 50:	
John Mullett	13.00
Chas. H. Pleasants*	12.00
Class 52:	
John Mullett	28.00
Putnam & Foley*	19.90
Chas. M. Childs & Co	50.00
Charles H. Pleasants	22.50

Proposals for coal for Norfolk navy-yard, under Bureau advertisement dated January 21, 1890; *opened February* 15, 1890.

Class 20:	
Cary & Co	$13,770.00
Johnson Bros*	12,060.00
David Duncan & Son	12,540.00
Sam'l G. French	13,200.00

Proposals for Constructor's Stores for the navy-yard, Norfolk, Va., under Bureau advertisement dated January 23, 1890; *opened February* 25, 1890.

Class A:	
S. C. Forsaith Machine Company	$266.89
H. G. Williams & Co	247.92
James W. Soper*	220.86
Rowland A. Robbins	239.33
Class B:	
H. G. Williams & Co.*	414.02
Charles H. Pleasants	427.94
Gould & Cutler Corporation	418.41
Class 38:	
Williamson Brothers*	842.00
S. C. Forsaith Machine Company	898.00
H. G. Williams & Co	892.00

Proposals for lathe for the Mare Island navy-yard, under Bureau advertisement dated January 24, 1890; *opened February* 25, 1890.

Class 38:	
Eugene L. Maxwell*	$875.00
S. C. Forsaith Machine Company	886.25

Proposals for hammock duck and sateen twills, New York navy-yard, under Bureau advertisement dated January 22, 1890; *opened February* 25, 1880.

Class 14.—Hammock duck:	
Tissott & Schultz*	$534.80
Benj. Moore	535.00
Wm. A. Wheeler	565.00
Marc M. Michael	535.00
Rowland A. Robbins	535.00

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*Accepted.

Class 14.—Sateen twills:	
Tissot & Schultz**	$362.00
Benj. Moore	381.25
Wm. A. Wheeler	450.00
Rowland A. Robbins	371.50
Marc M. Michael	362.00

Proposals for lumber for the United States training station, Newport, R. I., under Bureau advertisement dated February 1, 1890; opened February 25, 1890.

Class A:	
Swinburn, Peckham & Co.*	$353.33

Proposals for cementing cellar floors, Naval Home, Philadelphia, Pa., under Bureau advertisement dated January 25, 1890; opened February 25, 1890.

Jacob R. Jordan	$1,650.00
American Artificial Stone Pavement Company*	1,275.00
R. C. Ballinger & Co	1,800.00

Proposals for Equipment supplies for navy-yard, Boston, under Bureau advertisement dated February 5, 1890; opened March 5, 1890.

Class A.—*Newark:*	
Rowland A. Robbins	$361.46
Putnam & Foley	348.34
Burditt & Williams†	451.83
J. B. Morrell & Co.*	320.55
Class B.—*Newark:*‡	
Rowland A. Robbins	1,099.10
Putnam & Foley	1,040.71
J. B. Morrell & Co	987.88
Class A.—*Philadelphia:*	
Rowland A. Robbins	344.70
Putnam & Foley	335.95
Burditt & Williams†	434.64
J. B. Morrell & Co.*	306.80
Class B.—*Philadelphia:*‡	
Rowland A. Robbins	937.90
Putnam & Foley	926.53
J. B. Morrell & Co	857.62
Class A.—*Bennington:*	
Rowland A. Robbins	146.58
Putnam & Foley	151.93
Burditt & Williams†	226.20
J. B. Morrell & Co.*	139.40
Class B.—*Bennington:*‡	
Rowland A. Robbins	455.62
Putnam & Foley	451.79
J. B. Morrell & Co	424.56
Class A.—*Concord:*	
Rowland A. Robbins	146.48
Putnam & Foley	151.93
Burditt & Williams†	226.20
J. B. Morrell & Co.*	139.40
Class B.—*Concord:*‡	
Rowland A. Robbins	455.62
Putnam & Foley	448.79
J. B Morrell & Co	424.66
Class 61.—*Newark:*	
Rowland A. Robbins*	44.26
J. W. Bond & Co	49.51
Class 61.—*Philadelphia:*	
Rowland A. Robbins*	44.26
J. W. Bond & Co	49.51

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* Accepted. ** Decided by lot. † Informal. ‡ Class not awarded.

Class 61.—*Bennington*:	
Rowland A. Robbins*	$41.41
J. W. Bond & Co	46.19
Class 61.—*Concord*:	
Rowland A. Robbins*	41.41
J. W. Bond & Co	46.19
Class A.—*Bennington* (yeoman):	
Rowland A. Robbins	7.90
Putnam & Foley*	7.80
Burditt & Williams†	4.20
Class B.—*Bennington* (yeoman):	
Rowland A. Robbins*	35.63
J. W. Bond & Co	54.46
Class A.—*Concord* (yeoman):	
Rowland A. Robbins	7.90
Putnam & Foley*	7.80
Burditt & Williams†	4.20
Class B.—*Concord* (yeoman):	
Rowland A. Robbins*	35.63
J. W. Bond & Co	54.46
Class A.—*Philadelphia* (yeoman):	
Rowland A. Robbins	7.90
Putnam & Foley*	7.80
Burditt & Williams†	4.20
Class B.—*Philadelphia* (yeoman):	
Rowland A. Robbins*	35.63
J. W. Bond & Co	54.46
Class A.—*Newark* (yeoman):	
Rowland A. Robbins	7.90
Putnam & Foley*	7.80
Burditt & Williams†	4.20
Class B.—*Newark* (yeoman):	
Rowland A. Robbins*	35.63
J. W. Bond & Co	54.46

Proposals for drilling machine for the New York navy-yard, under Bureau advertisement dated February 3, 1890; *opened March* 5, 1890.

Thomas H. Dallett & Co*	$2,475.00

Proposals for coal for the New York navy-yard, under Bureau advertisement dated February 7, 1890; *opened March* 5, 1890.

Class 20:	
H. A. Achternacht	$1,755.00
David Duncan & Son*	1,552.50
Barber & Ziegler	1,710.00

Proposals for gaskets, etc., for the Mare Island navy-yard, under Bureau advertisement dated February 4, 1890; *opened March* 5, 1890.

Class B.—Gaskets:	
W. F. Bowers*	$116.00

Proposals for Albany boards for the navy-yard, New York, under Bureau advertisement dated February 13, 1890; *opened March* 10, 1890.

2,273 feet Albany boards:	
Joseph W. Duryee	$574.25
John McClave	500.00
Charles A. Bulmer*	475.00
John Kenney	486.25
Watson & Pittinger	518.75

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* Accepted. † Informal.

Proposals for boiler tubes for navy-yard, Mare Island, under Bureau advertisement dated February 10, 1890; *opened March* 15, 1890.

Class 53.—Tubes:	
Carolan & Co.*	$768.00
Albert Gallatin	1,056.00
Whitely, Spowers & Co	900.00
S. C. Forsaith Machine Co	1,075.20

Proposals for provisions for the navy-yard, New York, under Bureau advertisement dated February 19, 1890; *opened March* 20, 1890.

10,000 pounds corn-meal (per pound):	
Kemp, Day & Co	0.02\frac{9}{10}$
J. B. Morrell & Co.*	.02$\frac{88}{100}$
Thurber, Whyland & Co	.03$\frac{64}{100}$
Francis H. Leggett & Co	.02$\frac{87}{100}$
10,000 pounds oatmeal (per pound):	
Kemp, Day & Co	.04$\frac{1}{4}$
J. B. Morrell & Co	.03$\frac{8}{10}$
Thurber, Whyland & Co	.05$\frac{17}{100}$
Francis H. Leggett & Co	.04$\frac{44}{100}$
5,000 pounds rye flour (per pound):	
Kemp, Day & Co	.03$\frac{1}{4}$
J. B. Morrell & Co*	.03$\frac{8}{100}$
F. H. Leggett & Co	.04$\frac{17}{100}$
Thurber, Whyland & Co	.03$\frac{35}{100}$
5,000 pounds hominy (per pound):	
Kemp, Day & Co	.03$\frac{1}{8}$
J. B. Morrell & Co*	.02$\frac{5}{8}$
F. H. Leggett & Co	.03$\frac{1}{8}$
Thurber, Whyland & Co	.04$\frac{7}{10}$
70,000 pounds wheat flour (per pound):	
J. B. Morrell & Co	.02$\frac{375}{1000}$
F. H. Leggett & Co	.02$\frac{44}{100}$
Thurber, Whyland & Co	.02$\frac{53}{100}$
30,000 pounds salt pork, in barrels (per pound):	
Armour & Co	.06$\frac{1}{2}$
Chas. F. Mattlage	.06$\frac{22}{100}$
J. B. Morrell & Co	.06$\frac{475}{1000}$
10,000 pounds salt pork, in one-half barrels (per pound):	
Armour & Co	.07
Charles H. Mattlage*	.06$\frac{72}{100}$
J. B. Morrell & Co	.06$\frac{85}{100}$
3,000 gallons beans (per gallon):†	
Kemp, Day & Co	.31$\frac{1}{2}$
Diedrich Schmidt	.34
Charles F. Mattlage	.34$\frac{1}{4}$
F. H. Leggett & Co	.34$\frac{3}{8}$
Thurber, Whyland & Co	.33$\frac{71}{100}$
N. Millerd & Co	.34$\frac{5}{8}$
45,000 pounds salt beef in barrels:†	
Armour & Co	.04$\frac{1}{2}$
Charles F. Mattlage	.03$\frac{81}{100}$
J. B. Morrell & Co	.04$\frac{1}{4}$
Henry N. Anthony	.04$\frac{4}{10}$
15,000 pounds salt beef in half barrels (per pound):	
Armour & Co	.05
Charles F. Mattlage	.04$\frac{59}{100}$
J. B. Morrell & Co	.04$\frac{65}{100}$
Henry M. Anthony*	.04$\frac{53}{100}$
F. H. Leggett & Co	.04$\frac{73}{100}$
10,000 pounds rice (per pound):†	
Kemp, Day & Co	.07$\frac{1}{2}$
Diedrich Schmidt	.05$\frac{91}{100}$
F. H. Leggett & Co	.06$\frac{23}{100}$
Thurber, Whyland & Co	.05$\frac{83}{100}$

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* Accepted. † No award.

3,000 pounds raisins (per pound):	
Kemp, Day & Co*	$0.10½
Thurber, Whyland & Co	.15
Francis H. Leggett & Co	.11
2,000 pounds currants:	
Kemp, Day & Co*	.07½
J. B. Morrell & Co	.07$\frac{2}{10}$
Thurber, Whyland & Co	.14
Francis H. Leggett & Co	.08⅞
3,000 pounds prunes (per pound):	
Kemp, Day & Co	.09½
J. B. Morrell & Co*	.07
Thurber, Whyland & Co	.14
Francis H. Leggett & Co	.08¾
30,000 pounds tomatoes (per pound): †	
Kemp, Day & Co	.03$\frac{33}{100}$
F. H. Leggett & Co	.03$\frac{24}{100}$
Thurber. Whyland & Co	.03$\frac{42}{100}$
10,000 pounds roast beef: †	
Armour & Co	.07½
Kemp, Day & Co	.10$\frac{96}{100}$
Henry M. Anthony	.07$\frac{34}{100}$
F. H. Leggett & Co	.06$\frac{74}{100}$
25,000 pounds canned mutton (per pound):	
Kemp, Day & Co	.10$\frac{96}{100}$
F. H. Leggett & Co*	.09$\frac{33}{100}$
30,000 pounds canned corn beef (per pound): †	
Armour & Co	.10½
Charles F. Mattlage	.08$\frac{73}{100}$
Henry M. Anthony	.10$\frac{39}{100}$
Francis H. Leggett & Co	.08$\frac{72}{100}$
10,000 pounds brawn (per pound):	
Armour & Co	.10½
Charles F. Mattlage*	.08$\frac{6}{10}$
Henry M. Anthony	.10$\frac{46}{100}$
Francis H. Leggett & Co	.08$\frac{93}{100}$
20,000 pounds ham (per pound): †	
Armour & Co	.14$\frac{87}{100}$
Henry M. Anthony	.13$\frac{56}{100}$
10,000 pounds bacon (per pound): †	
Armour & Co	.13
Kemp, Day & Co	.09$\frac{8}{10}$
Charles F. Mattlage	.08$\frac{97}{100}$
Henry M. Anthony	.09$\frac{96}{100}$
10,000 pounds sausage (per pound): †	
Armour & Co	.09$\frac{4}{10}$
Kemp, Day & Co	.12
Henry M. Anthony	.10$\frac{10}{100}$
Francis H. Leggett & Co	.09$\frac{33}{100}$
5,000 pounds tea (per pound): †	
Thornton N. Motley	.22$\frac{8}{10}$
Kemp, Day & Co	.29½
Diedrich Schmidt	.35½
J. B. Morrell & Co	.20½
F. H. Leggett & Co	.20$\frac{33}{100}$
M. F. Powers & Sons	.21½
N. Millerd & Co	.34½
Robert G. Thomas	.23½
3,000 pounds cocoa (per pound):	
Kemp, Day & Co.*	.27$\frac{9}{10}$
Thurber, Whyland & Co	.30$\frac{46}{100}$
100,000 pounds sugar (per pound): †	
Diedrich Schmidt	.06$\frac{37}{100}$
Francis H. Leggett & Co	.06$\frac{37}{100}$
Thurber, Whyland & Co	.06$\frac{30}{100}$
20,000 pounds pickles (per pound): †	
Kemp, Day & Co	.08$\frac{9}{10}$
F. Foehrenbach & Co	.08½

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* Accepted. † No award.

20,000 gallons molasses (per gallon): †	
Thornton N. Motley	$0.23
Diedrich Schmidt	.25½
Francis H. Leggett & Co	.24¾
3,000 gallons vinegar (per gallon):	
F. Foehrenbach & Co.*	.14½
30,000 pounds canned vegetables (per pound): †	
Kemp, Day & Co	.06$\frac{24}{100}$
Francis H. Leggett & Co	.05$\frac{83}{100}$
Thurber, Whyland & Co	.06$\frac{25}{100}$

Proposals for small stores for the navy-yard, New York, under Bureau advertisement dated February 19, 1890; opened March 20, 1890.

1,000 agate bowls:	
Wechsler & Abraham	$0.35
Rowland A. Robbins	.30$\frac{9}{10}$
J. B. Morrell & Co.*	.30¼
Tissot & Schultz	.30$\frac{9}{10}$
Marc M. Michael	.34
Wm. R. Thompson	.31$\frac{9}{10}$
1,000 agate cups:	
Wechsler & Abraham	.48
Rowland A. Robbins	.42$\frac{9}{10}$
J. B. Morrell & Co.*	.42¼
Tissot & Schultz	.42$\frac{9}{10}$
Marc M. Michael	.46
Wm. R. Thompson	.43$\frac{9}{10}$
2,000 agate plates:	
Wechsler & Abraham	.33
Rowland A. Robbins	.29$\frac{8}{10}$
J. B. Morrell & Co.*	.29¼
Marc M. Michael	.33
Wm. R. Thompson	.30$\frac{9}{10}$
Tissot & Schultz	.29$\frac{9}{10}$
2,000 shoe-brushes: †	
Wechsler & Abraham	.24¾
Rowland A. Robbins	.20$\frac{97}{100}$
J. B. Morrell & Co	.28
Tissot & Schultz	.25
Marc M. Michael	.21$\frac{9}{10}$
Wm. R. Thompson	.22$\frac{48}{100}$
1,000 coarse combs:	
Wechsler & Abraham	.07
Rowland A. Robbins	.04$\frac{97}{100}$
Tissot & Schultz*	.04$\frac{9}{10}$
Marc M. Michael	.05$\frac{17}{100}$
1,000 jack-knives: †	
M. F. Rockwell & Co	.35
Rowland A. Robbins	.37
Tissot & Schultz	.45
Marc M. Michael	.50
Alexis Witte	.39¼
2,000 dozen rubber buttons (small, per dozen):	
Wechsler & Abraham	.04¼
Rowland A. Robbins	.03$\frac{97}{100}$
Tissot & Schultz*	.03¾
Marc M. Michael	.04$\frac{43}{100}$
5,000 spools sewing silk: †	
Wechsler & Abraham	.04
Rowland A. Robbins	.03$\frac{97}{100}$
Tissot & Schultz	.04$\frac{13}{100}$
Marc M. Michael	.02$\frac{98}{100}$
F. A. Ernst	.03$\frac{4}{10}$
30,000 pounds salt-water soap: †	
F. A. McKeown	.03⅝
Rowland A. Robbins	.04$\frac{17}{100}$
Tissot & Schultz	.04

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* Accepted. † No award.

1,000 whisp brooms: †	
Wechsler & Abraham	$0.14¼
Rowland A. Robbins	.16$\frac{5}{10}$
J. B. Morrell & Co	.18¼
Tissot & Schultz	.15
Marc M. Michael	.17
William R. Thompson	.12$\frac{98}{100}$
2,000 pieces white tape (per piece):	
Wechsler & Abraham	.01¼
Tissot & Schultz*	.01$\frac{31}{100}$
Marc M. Michael	.01$\frac{48}{100}$
1,000 scrub brushes: †	
Wechsler & Abraham	.19¼
Rowland A. Robbins	.15$\frac{47}{100}$
J. B. Morrell & Co	.15
Tissot & Schultz	.20
Marc M. Michael	.17$\frac{2}{10}$
William R. Thompson	.17$\frac{4}{10}$

Proposals for Steam-Engineering stores for the Thetis, Mare Island navy-yard, under Bureau advertisement dated February 24, 1890; opened March 20, 1890.

Class A:	
A. Gallatin *	$478.97
R. A. Robbins	621.99
Dunham, Carrigan & Hayden Company	610.08
Hawley Bros. Hardware Company	535.22
Class B:	
Charles H. Pleasants*	62.70
Hawley Bros. Hardware Company	64.22
Class C:	
S. C. Forsaith Machine Company	129.55
A. Gallatin*	57.15
Rowland A. Robbins	217.00
Hawley Bros. Hardware Company	214.80
Class D:	
A. Gallatin*	101.50

Proposals for Steam Engineering for the Alliance, Norfolk navy-yard, under Bureau advertisement dated February 24, 1890; opened March 20, 1890.

Class A:	
J. B. Morrell & Co.*	87.19
Rowland A. Robbins	88.01
Mayer & Co	126.40
Class B:	
Mayer & Co	213.60
Charles H. Pleasants	215.90
Stevenson Bros. & Co.*	161.84

Proposals for mild steel plates for the U. S. S. Texas, at the Norfolk Navy-Yard under Bureau advertisement dated February 21, 1890; opened March 20, 1890.

Class 44:	
S. C. Forsaith Machine Company*	$538.49
Carnegie, Phipps & Co	615.92

Proposals for tobacco for New York navy-yard, under Bureau advertisement dated February 18, 1890; opened April 1, 1890.

80,000 pounds tobacco (per pound):	
Thurber, Whyland & Co	$0.36
Francis H. Leggett & Co	.35$\frac{47}{100}$
J. B. Morrell & Co	.36¼
John L. Barber & Son	.38
Myers Bros. & Co	.38

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* Accepted. † No award.

80,000 pounds tobacco (per pound)—Continued.

Chas. P. Buchanan, Bid A	$0.37
Chas. P. Buchanan, Bid B	.37
Chas. P. Buchanan, Bid C	.38
Hicks Tobacco Company	.35¼
Geo. D. Finley	.32$\frac{9}{10}$
P. H. Mayo & Bros. *	.35
Benj. Moore	.37½

Proposals for engineers' stores for the "Baltimore," Norfolk navy-yard, under Bureau advertisement dated February 25, 1890; opened April 1, 1890.

Class A:	
Norfolk Supply Company *	$236.18
J. B. Morrell & Co	328.22
R. A. Robbins	377.65
C. J. Griffith & Co	273.75
Mineralized Rubber Company	Informal.
Class B:	
Norfolk Supply Company *	223.45
J. B. Morrell & Co	226.52
Jas. W. Soper	231.52
E. J. Griffith & Co	307.97
Class C:	
Norfolk Supply Company	79.50
J. B. Morrell & Co	80.00
Chas. H. Pleasants	71.80
E. J. Griffith & Co	82.00
Stevenson Bros. & Co	83.50
Melville Lindsay *	49.75
Mineralized Rubber Company	102.60
Class D:	
Charles H. Pleasants	162.00
Manhattan Oil Company †	110.50
Vacuum Oil Company	169.25
E. J. Griffith & Co	138.00
Stevenson Bros. & Co. *	144.00
Class E:	
Norfolk Supply Company *	93.44
J. B. Morrell & Co	170.56
Rowland A. Robbins	115.70
E. J. Griffith & Co	96.80
Stevenson Bros. & Co	187.58
Melville Lindsay	93.50
Mineralized Rubber Company	Informal.
Class F:	
J. B. Morrell & Co	90.30
Chas. H. Pleasants *	89.27
E. J. Griffith & Co	94.65
Class G:	
J. B. Morrell & Co. *	89.03
Class H:	
Norfolk Supply Company *	258.39
J. B. Morrell & Co	269.75
Rowland A. Robbins	360.60
E. J. Griffith & Co	274.80

Proposals for diving suits for the "Baltimore," Norfolk navy-yard, under Bureau advertisement dated February 26, 1890; opened April 1, 1890.

Class 59:	
A. Schrader & Son	$482.00
R. A. Robbins	521.80
S. C. Forsaith Machine Company	509.00
Tissot & Schultz	533.41
Melville Lindsay *	481.50

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* Accepted. † Informal.

Proposals for material for chains for the monitors at the Boston navy-yard, under Bureau advertisement dated February 27, 1890; opened April 1, 1890.

Class 15:	
Rowland A. Robbins	$904.40
Burditt & Williams *	812.00
Putnam & Foley	927.50
West End Rolling Mill Company †	627.20
J. B. Morrell & Co	840.00
Class 25:	
Rowland A. Robbins	500.00
Boston Gas-Light Company*	369.00
Class 50:	
John Mullett	23.50
Chas. H. Pleasants *	23.48
Class 52:	
Rowland A. Robbins	68.00
Putnam & Foley	39.80
John Mullett*	39.50
Chas. H. Pleasants	52.00

Proposals for coal for Washington and Norfolk, under Bureau advertisement dated February 28, 1890; opened April 1, 1890.

Class 20—Washington: ‡	
Wm. Lamb & Co	$9,750.00
Wm. L. Read	7,930.00
Johnson Bros	8,424.00
John Miller	7,294.00
Class 20—Norfolk:	
Wm. Lamb & Co.*	3,300.00

Proposals for coal for Mare Island navy-yard, under Bureau advertisement dated March 1, 1890; opened April 1, 1890.

200 tons coal:	
Wm. Walker	$2,300.00
James McCudden*	2,000.00
R. Dunsmuir & Sons	2,030.00
A. Powell	2,020.00
Wilson & O'Brien	2,010.00

Proposals for material for the U. S. S. Lancaster, at the navy-yard, Portsmouth, under Bureau advertisement dated March 3, 1890; opened April 1, 1890.

Class 36:	
Joseph W. Duryee*	$2,537.50
Class 37:	
Joseph W. Duryee *	175.00
Class 39:	
Burditt & Williams	1,480.42
J. B. Morrell & Co	1,543.80
Charles H. Pleasants	1,739.24
Rider & Cotton	1,413.26
Colwell Lead Company *	1,365.32
Rowland A. Robbins	1,633.05
S. C. Forsaith Machine Company	1,487.86
Thornton N. Motley	1,531.64
E. J. Griffiths & Co	1,657.00
Class 41:	
Burditt & Williams*	151.75
J. B. Morrell & Co	190.65
Charles H. Pleasants	201.20
Rider & Cotton	163.70
Rowland A. Robbins	175.62
James W. Soper	161.72
S. C. Forsaith Machine Company	173.21
Thornton N. Motley	226.10
E. J. Griffith	195.30

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* Accepted. † Informal. ‡ No award.

Class 47:	
Burditt & Williams	$38.45
J. B. Morrell & Co.*	36.40
Charles H. Pleasants	40.85
Rider & Cotton	49.00
Rowland A. Robbins	45.10
James W. Soper	42.65
S. C. Forsaith Machine Company	58.05
E. J. Griffith & Co	52.50
Class 48:	
J. B. Morrell & Co	96.05
Chas. H. Pleasants	95.59
Rider & Cotton	98.59
Gould & Cutler Corporation*	92.27
Rowland A. Robbins	102.50
S. C. Forsaith Machine Company	116.30
E. J. Griffith & Co	124.60
Class 52, A:	
J. B. Morrell & Co	1,299.59
Charles H. Pleasants	1,358.64
Rider & Cotton	1,354.24
Gould & Cutler Corporation*	1,263.84
Rowland A. Robbins	1,352.69
S. C. Forsaith Machine Company	1,517.18
Charles M. Childs & Co.†	1,242.81
Thornton N. Motley	1,314.75
E. J. Griffith & Co	1,333.50
Class 52, B:	
Burdtit & Williams	191.84
Charles H. Pleasants*	190.96
A. C. Forsaith Machine Company	204.16
Class 53:	
Burditt & Williams	265.50
J. B. Morrell & Co	278.00
Charles H. Pleasants	273.00
Rider & Cotton	262.50
Colwell Lead Company*	256.20
Rowland A. Robbins	277.20
S. C. Forsaith Machine Company	299.88
Class 58:	
Burditt & Williams	31.63
J. B. Morrell & Co	37.74
Charles H. Pleasants	39.49
Rider & Cotton	35.74
James W. Soper	34.12
Thornton N. Motley*	30.37
E. J. Griffith & Co	32.09
Class 66:	
Burditt & Williams	150.70
J. B. Morrell & Co	128.76
Rider & Cotton	47.29
Arcade File Works*	31.01
Rowland A. Robbins	117.00
James W. Soper	102.70
Thornton N. Motley	95.37
E. J. Griffith & Co	51.73
Class miscellaneous:	
Burditt & Williams*	118.93
J. B. Morrell & Co	150.30
Rider & Cotton	130.50
Rowland A. Robbins	148.90
E. J. Griffith & Co	175.50

Proposals for lumber for the New York navy-yard, under Bureau advertisement dated March 5, 1890; opened April 8, 1890.

Class 36:	
R. A. Robbins	$464.12
Jno. Kenney	400.64

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* Accepted. † Informal.

Class 36—Continued.	
Watson & Pittinger *	$344.39
Jos. W. Duryee	751.92
Eppinger & Russell	783.00

Proposals for constructor's stores for the Baltimore at the Norfolk navy-yard, under Bureau advertisement dated March 6, 1890; opened April 8, 1890.

Class 11:	
Charles H. Pleasants	$88.27
E. J. Griffith & Co.*	84.06
Class 17:	
Charles H. Pleasants	35.92
Norfolk Supply Company *	33.17
E. J. Griffith & Co	36.08
Class 38:	
S. C. Forsaith Machine Company	218.12
Norfolk Supply Company*	207.25
E. J. Griffith & Co	207.34
Class 52, A:	
Charles M. Childs & Co.†	572.80
S. C. Forsaith Machine Company	621.96
Charles H. Pleasants	607.15
Norfolk Supply Company	670.52
E. J. Griffith & Co.*	598.39
Class 52, B:	
Charles H. Pleasants*	99.00
Class 48:	
S. C. Forsaith Machine Company	42.40
Charles H. Pleasants	41.60
E. J. Griffith & Co.*	36.80
Class 59:	
B. H. Shoemaker*	64.16
Class 65:	
Norfolk Supply Company*	43.50
E. J. Griffith & Co	47.40
Class 66:	
Charles H. Pleasants	38.32
Norfolk Supply Company*	33.06
E. J. Griffith & Co	36.97
Class 68:	
S. C. Forsaith Machine Company	175.31
Norfolk Supply Company*	132.84
E. J. Griffith & Co	140.90
Class miscellaneous:	
E. J. Griffith & Co.*	133.35

Proposals for constructor's stores for the Thetis and Mohican at Mare Island, under Bureau advertisement dated March 7, 1890; opened April 8, 1890:

Class A:	
A. Gallatin*	$201.40
Louis E. Lake	254.20
Class B:	
S. C. Forsaith Machine Company	204.00
A. Gallatin	216.00
William P. Fuller, jr.*	180.00
Charles H. Pleasants	191.20
Louis E. Lake	192.00
Class C:	
S. C. Forsaith Machine Company	256.66
C. M. Childs & Co.†	197.38
A. Gallatin	219.30
William P. Fuller, jr.*	166.39
Charles H. Pleasants	243.25
Class D:	
A. Powell	177.04
A. Gallatin*	164.00

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*Accepted. †Informal.

Class D—Continued.	
William Walker	$183.00
James McCudden	178.00
Class E:	
A. Gallatin*	25.00
Class F:	
A. Powell*	50.00
A. Gallatin	75.00
William Walker	60.00
James McCudden	55.00
Class G:	
S. C. Forsaith Machine Company	355.39
C. M. Childs & Co.†	249.45
A. Gallatin	295.99
Wm. P. Fuller, jr.*	223.04
Charles H. Pleasants	306.58
Class F:	
S. C. Forsaith Machine Company	78.00
A. Gallatin	81.00
Wm. P. Fuller, jr.*	67.50
Chas. H. Pleasants	71.70
Louis E. Lake	72.00

Proposals for stores for the Michigan at the New York navy-yard, under Bureau advertisement dated March 8, 1890; *opened April* 8, 1890.

Class A:	
Tissot & Schultz	$126.35
Rowland A. Robbins*	50.00

Proposals for coal for the Washington navy-yard, under Bureau advertisement dated April 3, 1890; *opened April* 10, 1890.

Class 20:	
Johnson Bros	$8,424.00
Wm. L. Read*	7,852.00

Proposals for equipment supplies for new cruisers, Boston navy-yard, under Bureau advertisement dated March 12, 1890; *opened April* 15, 1890.

Class A.—*Newark*: ‡	
Putnam & Foley	$588.00
Wm. M. Clark	659.25
J. B. Morrell & Co	663.75
John P. Lovell Arms Company	588.00
Class B.—*Newark*:	
Putnam & Foley	453.21
Burditt & Williams	537.20
Rowland A. Robbins*	430.61
J. B. Morrell & Co	486.13
Class A.—*Philadelphia*: ‡	
Putnam & Foley	588.00
Wm. A. Clarke	659.25
J. B. Morrell & Co	663.75
John P. Lovell Arms Company	588.00
Class B.—*Philadelphia*:	
Putnam & Foley	349.13
Burditt & Williams	414.41
Rowland A. Robbins*	324.05
J. B. Morrell & Co	361.06
Class A.—*Bennington*: ‡	
Putnam & Foley	235.20
Wm. M. Clark	263.70
J. B. Morrell & Co	265.50
John P. Lovell Arms Company	235.20

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* Accepted. † Informal. ‡ No award.

Class B.—*Bennington:*	
Putnam & Foley	$217.59
Burditt & Williams	260.46
Rowland A. Robbins *	203.64
J. B. Morrell & Co	226.42
Class A.—*Concord:* †	
Putnam & Foley	235.20
Wm. M. Clark	263.70
J. B. Morrell & Co	265.50
John P. Lovell Arms Company	235.20
Class B.—*Concord:*	
Putnam & Foley	220.56
Burditt & Williams	263.43
Rowland A. Robbins *	206.07
J. B. Morrell & Co	228.67

Proposals for material for steel tops U. S. S. San Francisco, Mare Island navy-yard, under Bureau advertisement dated March 10, 1890; *opened April* 15, 1890.

Class A:	
Austin & Phelps *	$1,501.36
S. C. Forsaith Machine Company	1,759.83

Proposals for granite and rolled steel beams for the Mare Island navy-yard, under Bureau advertisement dated March 15, 1890; *opened April* 15, 1890.

Class 13: †	
James P. M. Phillips	$5,775.00
A. Powell	6,050.00
Pacific Stone Company	4,290.00
James McCudden	6,160.00
Class 38:	
Austin & Phelps	756.00
Pacific Stone Company *	294.00
A. Gallatin	420.00

Proposals for monitor screw-machine, New York navy-yard, under Bureau advertisement dated March 14, 1890; *opened April* 15, 1890.

Class 38:	
The Pratt & Whitney Company	$2,625.00
Rowland A. Robbins *	2,619.00

Proposals for photographic material, Mare Island, under Bureau advertisement dated March 13, 1890; *opened April* 15, 1890.

Class 5:	
Louis E. Lake	$139.15
Hirsch, Kahn & Co	118.38
Rowland A. Robbins	132.95
Charles H. Pleasants *	87.60
Class 61:	
Louis E. Lake	86.80
Hirsch, Kahn & Co	76.00
Rowland A. Robbins *	52.40

Proposals for forgings for the Maine, New York navy-yard under Bureau advertisement dated March 11, 1890; *opened April* 15, 1890.

Class 59:	
Midvale Steel Company	$2,660.00
Bethlehem Iron Company *	2,100.00

Proposals for lathe and other tools for the Baltimore, at the Norfolk navy-yard, under Bureau advertisement dated March 17, 1890; *opened April* 22, 1890.

Class 38:	
S. C. Forsaith Machine Company *	$616.40
Putnam Machine Company	Informal.
D. Kelley	1,050.00

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* Accepted. † No award.

Class 68:	
S. C. Forsaith Machine Company	$41.00
Putnam Machine Company	Informal.
D. Kelley *	40.00

Proposals for lumber for the Mare Island navy-yard, under Bureau advertisement dated March 18, 1890; *opened April* 22, 1890.

Class 33:	
A. S. Carman	$240.00
A. Powell*	220.00
James McCudden	230.00
Wm. Walker	230.00
Jos. W. Duryee	240.00
Class 34:	
A. S. Carman	967.04
A. Powell	858.25
James McCudden	906.60
Wm. Walker	731.00
Jos. W. Duryee *	725.28
Class 37:	
A. S. Carman	280.00
A. Powell*	245.00
James McCudden	262.50
Wm. Walker	367.50
Class 33:	
A. S. Carman	245.00
A. Powell*†	240.00
James McCudden	250.00
Wm. Walker	240.00
Jos. W. Duryee	240.00
Class 37:	
A. S. Carman	4,774.00
A. Powell*	4,691.50
James McCudden	4,814.00
Wm. Walker	5,043.50
Jos. W. Duryee	5,060.00

Proposals for yellow pine plank, tools, etc., for the New York navy-yard, under Bureau advertisement dated March 19, 1890; *opened April* 22, 1890.

Class 36:	
South Brooklyn Saw-Mill Company	$540.00
John McClave	420.00
Tissot & Schultz	5,280.00
Joseph W. Duryee*†	420.00
John Kenney	720.00
Class A:	
Rowland A. Robbins *	78.67
James W. Soper	84.00
Tissot & Schultz	83.31
J. B. Shannon & Sons	84.26
J. B. Morrell & Co	92.52
Class 68:	
James W. Soper	48.50
Tissot & Schultz *	47.49
S. C. Forsaith Machine Company	58.50

Proposals for mineral oil for the League Island navy-yard, under Bureau advertisement dated March 20, 1890; *opened April* 22, 1890.

Class 50:	
Stevenson Bros	$120.00
Chas. K. Smith & Co.*	110.00

Proposals for lumber, paint, etc., for the Naval Station, New London, under Bureau advertisement dated March 21, 1890; *opened April* 22, 1890.

Class A:	
J. B. Morrell & Co	$144.15
Chaney & Latham *	67.27

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* Accepted. † Awarded by lot.

Class A—Continued.	
Newman & Cronin	Informal
Burditt & Williams	$99.90
Class B: †	
Burditt & Williams	249.00
Class C: †	
Burditt & Williams	127.50
Class D:	
J. B. Morrell & Co	113.00
Chaney & Latham *	14.50
Newman & Cronin	35.00
Burditt & Williams	53.00
Class E:	
Charles H. Pleasants *	89.64
J. B. Morrell & Co	103.00
Chaney & Latham	92.85
Newman & Cronin	95.36
Burditt & Williams	142.05
Class F:	
Burditt & Williams *	28.00

Proposals for roofing slate for the League Island navy-yard, under Bureau advertisement dated March 22, 1890; *opened April* 29, 1890.

Class 13:	
Rowland A. Robbins	$502.50
J. R. Williams & Co	471.25
Edward M. Burke *	450.00

Proposals for muriatic acid for the navy-yard, Norfolk, under Bureau advertisement dated March 24, 1890; *opened April* 29, 1890.

Class 52:	
August Buff *	$245.85
Rowland A. Robbins	346.50
Charles M. Childs & Co	513.75
E. J. Griffith & Co	346.50
Charles H. Pleasants	326.70

Proposals for coal for New York navy-yard under Bureau advertisement dated March 25, 1890; *opened April* 29, 1890.

Class 20:	
David B. Duncan	$4,140.00
Edward R. Dunham	4,060.00
Ward & Oliphant	3,950.00
David S. Wells	3,960.00
Samuel G. French	4,100.00
J. D. Cox *	3,940.00

Proposals for iron, etc., for the New York navy-yard, under Bureau advertisement dated March 26, 1890; *opened April* 29, 1890.

Class 40:	
S. C. Forsaith Machine Company	$257.20
Frank H. Woodruff	240.00
P. F. McDonald	269.00
Charles H. Pleasants	Informal
Rowland A. Robbins *	234.00
J. B. Morrell & Co	251.50
Class 49:	
S. C. Forsaith Machine Company { Bid A*	267.20
Bid B	328.00
P. F. McDonald	360.00
Charles H. Pleasants	Informal
Rowland A. Robbins	703.00
J. B. Morrell & Co	$276.67
Class A:	
Rowland A. Robbins *	233.46
J. B. Morrell & Co	444.73

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* Accepted. † No award.

Proposals for packing for the "Baltimore," Norfolk navy-yard, under Bureau advertisement dated March 28, 1890; opened April 29, 1890.

Class A:†	
J. B. Morrell & Co	$290.84
Page Belting Company	Informal
E. J. Griffith & Co	213.20
Norfolk Supply Company	241.80
Rowland A. Robbins	251.50

Proposals for lumber, paints, etc., for the U. S. Naval Academy, Annapolis, under Bureau advertisement dated March 29, 1890; opened April 29, 1890.

Class A:	
Joseph W. Duryee	$632.37
Otto Duker & Co	609.65
Wm. D. Gill*	602.37
Thomas W. Smith	707.65
Philip Walsh & Sons	Informal
Class B:	
Charles H. Pleasants*	56.04
Rowland A. Robbins	72.00
Class C:	
Charles H. Pleasants	80.45
J. B. Morrell & Co.*	66.45
Rowland A. Robbins	82.00
Class D:	
Chas. H. Pleasants*	43.80

Proposals for building material for the Torpedo Station, Newport, R. I., under Bureau advertisement, March 31, 1890; opened April 29, 1890.

Class A:	
Swinburne & Peckham	$307.95
Wetherill & Bro	Informal
J. B. Morrell & Co.*	303.32
Ansel W. Paine	429.50
Gould & Cutler Corporation	305.00
Charles H. Pleasants	306.78
Class B:	
Joseph W. Duryee*	560.00
Swinburne & Peckham	680.00
Ansel W. Paine	910.00
W. W. McCullough	Informal

Proposals for machinery steel for the navy-yard, New York, under Bureau advertisement dated April 4, 1890; opened April 29, 1890.

Class 43:	
S. L. Forsaith Machine Company	$329.80
Midvale Steel Company	485.00
Temple & Lockwood	Informal
Rowland A. Robbins	426.80
Thomas C. Burrows*	308.00

Proposals for building material for navy-yard, Portsmouth, N. H., under Bureau advertisement dated April 5, 1890; opened April 29, 1890.

Class A:	
Ansel W. Paine	$77.85
John H. Broughton*	45.50

Proposals for "ordnance stores" for the navy-yard, Washington, under Bureau advertisement dated April 3, 1890; opened April 29, 1890.

Class 10:	
J. B. Shannon & Sons	$277.44
A. C. Forsaith Machine Company	280.80
J. H. Sternberg & Sons*	242.40
Rowland A. Robbins	356.40
J. B. Kendall	253.20

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* Accepted. † No award.

Class 11:		
E. J. Griffith & Co		$70.50
J. B. Shannon & Sons		64.57
Rowland A. Robbins*		51.30
Class 13:		
Rowland A. Robbins*		580.00
W. W. McCullough		Informal
J. B. Kendall		590.00
Class 14:		
E. J. Griffith & Co		175.00
Woodward & Lothrop		158.50
Rowland A. Robbins*		137.00
Class 19:		
E. J. Griffith & Co.		782.50
Woodward & Lothrop*		787.50
Rowland A. Robbins		1,526.00
Class 20:		
Stevenson & Bros		1,660.00
Johnson Bros.*		945.00
J. Maury Dove		2,044.00
W. W. McCullough		Informal
Class 32:		
S. C. Forsaith Machine Company		3,114.38
Hain Belting Company		Informal
Billany & Cochrane		3,787.93
Stevenson & Bros		4,843.50
Melville Lindsay		3,355.62
Page Belting Company*		2,984.50
Grateton & Knight Manuf. Co		Informal
Rowland A. Robbins		3,006.25
J. B. Kendall		3,569.65
Class 35:		
Joseph W. Duryee*		6,712.50
Libby, Bittinger & Miller		10,822.50
J. W. Gaskill & Sons		8,205.00
Thomas W. Smith		Informal
W. W. McCullough		Informal
Class 38:		
E. S. Griffith & Co		1,023.87
S. C. Forsaith Machine Company*		1,005.67
Billany & Cochrane		1,054.78
Rowland A. Robbins		1,009.59
Class 39:		
E. J. Griffith & Co		147.50
Howard White*		134.00
Class 40:		
S. C. Forsaith Machine Company		590.00
J. B. Kendall*		500.00
Class 42:		
J. B. Kendall*		1,050.00
Class 43:		
S. C. Forsaith Machine Company	Bid A	3,754.60
	Bid B	1,553.35
Midvale Steel Company		1,660.00
Carpenter Steel Company*		3,130.00
Rowland A. Robbins		2,001.00
Class 47: †		
J. B. Shannon & Sons		96.66
Class 49:		
E. J. Griffith & Co		714.80
S. C. Forsaith Machine Company	A	909.93
	Bid B	926.75
J. R. Sternberg & Sons*		601.00
Rowland A. Robbins		898.75
J. B. Kendall		850.30
J. B. Shannon & Sons		759.48
Class 50: †		
William P. Feeney & Co		650.10

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*Accepted. † No award.

Class 50—Continued.	
E. J. Griffith & Co	$699.28
Stevenson Bros. & Co	815.50
Charles H. Pleasants	729.38
Class 51:	
J. B. Shannon & Sons*	44.27
Billany & Cochrane	65.00
Stevenson Bros. & Co	75.00
Rowland A. Robbins	68.00
Class 52, A: †	
Charles H. Pleasants	98.55
Class 52, B: †	
E. J. Griffith & Co	155.70
J. B. Shannon & Sons	177.25
Charles M. Childs & Co	165.70
Charles H. Pleasants	159.39
Class 56:	
E. J. Griffith & Co	50.45
J. B. Shannon & Sons	51.97
Billany & Cochrane	51.58
Charles H. Pleasants	57.02
J. B. Kendall *	49.45
Class 58:	
E. J. Griffith & Co	236.60
J. B. Shannon & Sons *	207.30
Billany & Cochrane	233.05
Rowland A. Robbins	217.25
J. B. Kendall	231.35
Class 60:	
Woodward & Lothrop	Informal.
Rowland A. Robbins *	93.30
Class 66: †	
James W. Soper	468.28
J. B. Shannon & Sons	495.09
Class 67:	
E. J. Griffith & Co *	117.65
J. B. Shannon & Sons	125.96
Billany & Cochrane	121.87
Class 68:	
James W. Soper	208.60
S. C. Forsaith Machine Company	206.84
Billany & Cochrane	206.55
Rowland A. Robbins *	176.31
Class 70:	
E. J. Griffith & Co	43.50
J. B. Shannon & Sons *	25.05
Class 71:	
E. J. Griffith & Co	311.40
Charles H. Pleasants *	219.25
J. B. Kendall	378.00
Class miscellaneous: †	
E. J. Griffith & Co	131.30
J. B. Shannon & Sons	88.54
Charles H. Pleasants	64.47

Proposals for lumber, paint, etc., for the Mare Island navy-yard, under Bureau advertisement dated April 7, 1890; *opened May* 6, 1890.

Class 37, A:	
James McCudden	$250.00
A. S. Carman	195.00
A. Powell	220.00
Wm. Walker *	165.00
Class 34:	
James McCudden	164.16
A. S. Carman	167.20
A. Powell *	159.60

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* Accepted. † No award.

Class 37, B:	
James McCudden	$320.00
A. S. Carman	320.00
A. Powell *	280.00
Class 40:	
Dunham, Carrigan and Hayden Company *	115.50
Carolan & Co	131.25
Charles H. Pleasants	180.50
Class 47:	
Dunham, Carrigan and Hayden Company *	39.40
Class 48:	
Charles M. Yates *	57.00
William P. Fuller, jr	57.50
Charles H. Pleasants	62.00
Class 52:	
Charles M. Yates *	966.30
William P. Fuller, jr	977.37
Charles H. Pleasants	Informal.
Class 58:	
W. R. S. Foye	70.40
Dunham, Carrigan and Hayden Company	60.79
Carolan & Co	85.95
Charles H. Pleasants *	53.50
Class 59:	
W. R. S. Foye	200.70
William Walker	161.62
Charles H. Pleasants *	144.91
Class miscellaneous:	
W. R. S. Foye	100.00
Dunham, Carrigan and Hayden Company	101.25
William P. Fuller, jr*	82.53
Class 35:	
James McCudden	500.00
A. S. Carman	440.00
A. Powell	420.00
William Walker *	400.00
Charles H. Pleasants	1,068.00
Class 61:	
Charles H. Pleasants *	43.89

Proposals for coal for the navy-yard, New York, under Bureau advertisement dated April 8, 1890; opened May 6, 1890.

Class 20:	
David S. Wells	$459.00
David Duncan & Son *	424.00
Samuel G. French	468.00

Proposals for coal for the Naval Academy, Annapolis, Md., under Bureau advertisement, dated April 9, 1890; opened May 6, 1890.

Class 20:	
Meredith, Winship & Co.*	$592.50

Proposals for plate girders for the navy-yard, New York, under Bureau advertisement, dated April 10, 1890; opened May 6, 1890.

Class 13:	
Rowland A. Robbins*	$1,073.00
S. C. Forsaith Machine Company	1,151.50

Proposals, for hose and tools for the New York navy-yard, under Bureau advertisement, dated April 12, 1890; opened May 13, 1890.

Class 26.—5,000 feet leading hose, per foot: †	
New York Belting and Packing Company	$0.73
Rowland A. Robbins	$.70\frac{25}{100}$
Eureka Fire Hose Company	.70

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* Accepted. † No award.

5,000 feet leading hose, per foot—Continued.	
Gutta Percha and Rubber Manufacturing Company	$0.70
The S. C. Forsaith Machine Company, Bid A	.78¼
The S. C. Forsaith Machine Company, Bid B	.59
Daniel A. Woodhouse	.70
John F. Lovejoy	.72
Class 26.—300 feet suction hose, per foot: ‡	
New York Belting and Packing Company	1.70
Rowland A. Robbins	1.70
Eureka Fire Hose Company	1.75
Gutta Percha and Rubber Manufacturing Company	2.00
S. C. Forsaith Machine Company, Bid A	1.17
S. C. Forsaith Machine Company, Bid B	1.17
Daniel A. Woodhouse	1.95
John F. Lovejoy	1.90
Class 26:	
New York Belting and Packing Company	4,160.00
Rowland A. Robbins	4,057.50
Eureka Fire Hose Company*	4,025.00
Gutta Percha and Rubber Manufacturing Company	4,100.00
S. C. Forsaith Machine Company, Bid A	4,276.00
S. C. Forsaith Machine Company, Bid B†	3,301.00
Daniel A. Woodhouse	4,085.00
John F. Lovejoy	4,170.00
Class 68, A:	
Rowland A. Robbins*	1,129.90
John F. Lovejoy	1,173.90
Class 51:	
New York Belting and Packing Company	135.00
Rowland A. Robbins	51.00
Ansel W. Payne*	48.00
S. C. Forsaith Machine Company	129.00
John F. Lovejoy	60.00
Tissot & Schultz	126.00
Class 11:	
Rowland A. Robbins	21.00
Ansel W. Paine*	18.35
Class 68, B:	
Rowland A. Robbins*	9.60
Ansel W. Paine	15.90

Proposals for equipment supplies for the Mare Island navy yard, under Bureau advertisement dated April 16, 1890; opened May 22, 1890.

Class 11:	
J. B. Morrell & Co	$97.95
Rowland A. Robbins*	81.20
W. R. S. Foye	120.75
Class 21:	
J. B. Morrell & Co.*	196.19
Rowland A. Robbins	303.52
L. M. Kellogg	221.75
Class 59:	
J. B. Morrell & Co.*	164.70
Rowland A. Robbins	167.76
Class 62:	
L. M. Kellogg*	42.00
Class 70:	
J. B. Morrell & Co.*	97.50
Rowland A. Robbins	180.00
W. R. S. Foye	210.00
Class miscellaneous:	
J. B. Morrell & Co.*	148.79
W. R. S. Foye	Informal.

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‡ No award. † Informal. * Accepted.

Proposals for bolts and steam beams for the navy-yard, Norfolk, under advertisement dated April 17, 1890; *opened May* 22, 1890.

Class 10:	
P. F. McDonald †	$577.60
S. C. Forsaith Machine Company	649.10
J. B. Morrell & Co*	629.55
Class 13:	
P. F. McDonald	1,462.33
Carnegie, Phipps & Co.*	786.43
S. C. Forsaith Machine Company	857.70

Proposals for lumber, etc., for the Washington navy-yard, under Bureau advertisement dated April 18, 1890; *opened May* 22, 1890.

Class 35:	
Ansel W. Paine	$285.00
Libby, Bittinger & Miller	264.00
W. W. McCullough *	240.10
Joseph W. Duryee	292.50
Class 39:	
Ansel W. Paine	46.50
J. B. Morrell & Co	45.00
Charles H. Pleasants*	39.66
Class 52:	
Ansel W. Paine	55.50
J. B. Morrell & Co	42.00
Charles H. Pleasants *	41.94
Class miscellaneous:	
Ansel W. Paine	45.50
J. B. Morrell & Co. *	30.90
Charles H. Pleasants	35.85
Class 36:	
W. W. McCullough	700.00
Joseph W. Duryee *	357.20

Proposals for "equipment and constructors' stores" for the navy-yard, New York, under Bureau advertisement dated April 19, 1890; *opened May* 22, 1890.

Class 59:	
Tissot & Schultz	$1,734.60
Rowland A. Robbins* ‡	1,417.50
John P. Lovell Arms Company	Informal.
J. B. Morrell & Co	1,417.50
Class 21:	
James M. Shaw & Co *	786.00
Class 31:	
Rowland A. Robbins	65.00
Ansel W. Paine*	40.20
J. B. Morrell & Co	56.54
Class 61:	
Rowland A. Robbins*	280.96
Class miscellaneous:	
Tissot & Schultz	25.10
J. B. Morrell & Co.*	23.22
Class 17:	
Tissot & Schultz	Informal.
Rowland A. Robbins*	25.70
S. C. Forsaith Machine Company	44.75
Eugene L. Maxwell	40.00
Class 38:	
Tissot & Schultz	87.88
Rowland A. Robbins	66.45
Ansel W. Paine*	14.78
S. C. Forsaith & Co	87.36
J. B. Morrell & Co	88.75
Billany & Cochrane	83.65
Class A:	
Rowland A. Robbins*	575.00
J. B. Morrell & Co	615.00

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*Accepted. † Informal. ‡ Decided by lot.

Proposals for steel bolts, blanks, etc., for the navy-yard, New York, under Bureau advertisement opened May 22, 1890.

Class 10.—Bolt blanks:	
Rowland A. Robbins	$4,800.00
John F. Lovejoy & Company	5,000.00
J. H. Sternberg & Son*	1,150.00
Greenlie, Wyatt & Co	5,600.00
Class 10.—Cruiser No. 7:	
J. B. Morrell & Co	144.50
Rowland A. Robbins	110.00
John F. Lovejoy & Company	140.00
J. H. Sternberg & Son*	105.50
Thornton N. Motley	160.00
S. C. Forsaith Machine Company	140.00
Billany & Cochrane	115.00
Greenlie, Wyatt & Co	260.00
Class 68.—Cruiser No. 7:	
J. B. Morrell & Co	27.90
Rowland A. Robbins	40.10
Thornton N. Motley*	27.00
S. C. Forsaith Machine Company	31.38
Billany & Cochrane	34.20
Class 10.—*Maine:*	
J. B. Morrell & Co	408.60
Rowland A. Robbins	305.00
John F. Lovejoy & Co	320.00
J. H. Sternberg & Son*	261.50
Thornton N. Motley	415.00
S. C. Forsaith Machine Company	354.00
Billany & Cochrane	282.00
Greenlie, Wyatt & Co	730.00
Class 38.—Cruiser No. 7:	
Tissot & Schultz	Informal.
J. B. Morrell & Co	162.14
Rowland A. Robbins*	143.34
John F. Lovejoy & Co	150.00
Eugene L. Maxwell	150.42
S. C. Forsaith Machine Company	155.42
Billany & Cochrane	145.64
T. N. Motley	150.75
Class 63:	
J. B. Morrell & Co	799.46
Rowland A. Robbins	932.00
John F. Lovejoy & Co	1,050.50
Eugene L. Maxwell	600.00
S. C. Forsaith Machine Company	719.69
Thornton N. Motley*	545.00

Proposals for coal, New York navy-yard, under Bureau advertisement dated April 28, 1890; *opened May* 22, 1800.

Class 20:	
David S. Wells	$3,980.00
Barber & Ziegler*	3,940.00
David Duncan & Son	4,290.00
Samuel G. French	3,980.00

Proposals for coal for navy-yard, Norfolk, and naval station, Key West, under Bureau advertisement dated May 9, 1890; *opened June* 10, 1890.

Class 20.—Norfolk:	
Geo. W. Taylor & Co	$13,410.00
Samuel G. French	13,320.00
Nottingham & Wren*	12,600.00
David Duncan & Son	12,870.00
Johnson Brothers	12,750.00

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* Accepted.

Class 20.—Key West:	
Samuel G. French*	$5,940.00
David Duncan & Son	6,450.00
Cary & Co	6,500.00
Johnson Brothers	6,150.00

Proposals for lumber, paving-blocks, etc., for the New York navy-yard, under Bureau advertisement dated May 8, 1890; *opened June* 10, 1890.

Class 36:	
Ansel W. Paine	$1,035.00
Joseph W. Duryee	897.00
John McClave*	640.00
South Brooklyn Saw Mill Company	734.00
John Kenney	841.00
Class 40:	
Rowland A. Robbins	44.55
J. B. Morrell & Co.*	34.50
Tissot & Schultz	44.85
Class 13, A:	
Rowland A. Robbins	890.00
Fred. Cochen	900.00
Tissot & Schultz	1,480.00
Mark Goodwin*	750.00
Class 13, B:	
Rowland A. Robbins	1,160.00
P. J. Carlin & Co	600.00
Fred. Cochen	400.00
Tissot & Schultz*	355.00
Class 13, C:	
Rowland A. Robbins	1,690.00
P. J. Carlin & Co	1,200.00
Fred. Cochen*	600.00
James Symington	930.00
Class 19, A:	
Rowland A. Robbins*	911.75
J. B. Morrell & Co	990.63
Tissot & Schultz	1,000.00
Class 19, B:	
Rowland A. Robbins	324.50
J. B. Morrell & Co.*	264.00
Class 21:	
Rowland A. Robbins*	938.23
J. B. Morrell & Co	991.00
James M. Shaw & Co	1,224.70
Class 31:	
Rowland A. Robbins	173.00
J. B. Morrell & Co.*	157.00
Webster & White	Informal
James M. Shaw & Co	205.00
Class miscellaneous:	
Ansel W. Paine	147.17
Rowland A. Robbins*	53.48
J. B. Morrell & Co	91.16

Proposals for engineering stores for the Mare Island navy-yard, under Bureau advertisement dated May 6, 1890; *opened June* 10, 1890.

Class C:	
J. B. Morrell & Co.*	$220.00
Class D:	
J. B. Morrell & Co	150.25
A. F. Underwood	162.45
Wm. P. Fuller, jr.*	117.63

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*Accepted.

Proposals for provisions for the Mare Island navy-yard, under Bureau advertisement dated May 7, 1890; opened June 10, 1890.

6,000 pounds corn-meal (per pound):	
Herman Levi*	0.03\frac{5}{10}$
Francis H. Leggett & Co	.05$\frac{7}{10}$
E. M. Wilson	.04
10,000 pounds oatmeal (per pound):	
Herman Levi*	.04$\frac{95}{100}$
Francis H. Leggett & Co.	.06$\frac{73}{100}$
E. M. Wilson	.05
13,000 pounds wheat flour (per pound):	
E. M. Wilson*	.02$\frac{1}{2}$
1,000 gallons beans (per gallon):	
Herman Levi*	.25$\frac{69}{100}$
500 gallons split pease (per gallon):	
Herman Levi*	.34$\frac{80}{100}$
5,500 pounds rice (per pound):	
Herman Levi*	.06$\frac{43}{100}$
E. M. Wilson	.07
2,000 pounds canned tomatoes (per pound):	
Herman Levi*	.04
Francis H. Leggett & Co.	.06$\frac{7}{100}$
E. M. Wilson	.06
5,000 pounds canned ham (per pound):	
Herman Levi*	.11$\frac{18}{100}$
Francis H. Leggett & Co	.17$\frac{5}{8}$
E. M. Wilson	.12$\frac{1}{2}$
4,000 pounds bacon (per pound):	
E. M. Wilson*	.15
500 pounds tea (per pound):	
Herman Levi	.44
Francis H. Leggett & Co.*	.29$\frac{11}{100}$
E. M. Wilson	.60
6,000 pounds pickles (per pound):	
Herman Levi*	.04$\frac{10}{100}$
E. M. Wilson	.15
300 gallons molasses (per gallon):	
Herman Levi*	.27
E. M. Wilson	.29
500 gallons vinegar (per gallon):	
Herman Levi*	.11$\frac{50}{100}$
E. M. Wilson	.15
7,000 pounds canned vegetables (per pound):	
Herman Levi*	.06$\frac{58}{100}$
Francis H. Leggett & Co	.07$\frac{77}{100}$
E. M. Wilson	.13

Proposals for furniture, etc., for the New York Navy-yard, under Bureau advertisement dated May 23, 1890; opened June 17, 1890.

Class 21:	
Joseph Wechsler*	$2,491.25
R. A. Robbins	2,528.35
John F. Lovejoy	2,830.90
Class A:	
J. B. Morrell & Co	46.65
R. A. Robbins*	41.70
John F. Lovejoy	49.55
Class B:	
J. B. Morrell & Co	127.50
R. A. Robbins*	121.80
John F. Lovejoy	153.75
Class 38, A:	
R. A. Robbins*	291.65
John F. Lovejoy	318.10
Billany & Cochrane	299.52

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*Accepted.

Class 38, A—Continued.	
S. C. Forsaith Machine Company	$335.62
James W. Soper	306.14
Class 13:	
Rowland A. Robbins *	307.20
John F. Lovejoy	384.00

Proposals for machinery and machine tools for the Mare Island navy-yard, under Bureau advertisement dated May 19 1890; *opened June* 17, 1890.

Class 38:	
Henry S. Manning *	$7,895.00
S. C. Forsaith Machine Company	8,426.00

Proposals for fencing material for the naval station New London, Conn., under Bureau advertisement dated May 16, 1890; *opened June* 17, 1890.

Class A:	
George M. Williams *	97.41
N. S. Gallup	Informal.

Proposals for Coal for the Mare Island navy-yard, under Bureau advertisement dated May 15, 1890; *opened June* 21, 1890.

Class 20:	
Rosenfeld's Sons *	$22,485.00
James McCudden	23,250.00
Mark W. Sewell	24,750.00
Sam'l G. French	27,360.00

Proposals for fresh beef, vegetables, bread, ice, etc., for the several navy-yards and stations under advertisement dated May 8, 1889, *opened June* 8, 1889.

(NOTE.—Fresh beef and vegetables are considered as one class, and awards made accordingly.)

NAVY-YARD, PORTSMOUTH, N. H.

16,000 pounds fresh beef:	
Herman R. Paul	0.07\frac{22}{100}$
Clarence M. Prince *	.07¼
16,000 pounds fresh vegetables:	
Herman R. Paul	.01$\frac{22}{100}$
Clarence M. Prince *	.01¼
13,000 pounds fresh bread:	
Clarence M. Prince *	.06

NAVY-YARD, BOSTON, MASS.

35,000 pounds fresh beef:	
Charles A. Simonds *	.11¼
Michael J. Doran	.12
35,000 pounds fresh vegetables:	
Charles A. Simonds *	.03
Michael J. Doran	.04
22,000 pounds fresh bread:	
George C. Stickney *	.05$\frac{4}{10}$
Austin & Graves	.06
32,400 pounds ice (per hundred):	
Drivers' Union Ice Company * †	.60
Boston Ice Company	.60
Charles A. Simonds	.70

TORPEDO STATION, NEWPORT, R. I.

30,000 pounds fresh beef:	
John T. Reagan	.09
Patrick Keefe *	.07
Sherman & Roony	.12

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*Accepted. † Decided by lot.

TORPEDO STATION, NEWPORT, R. I.—continued.

30,000 pounds fresh vegetables:	
Lawton Coggeshall	$0.02
John T. Reagan	.03
Patrick Keefe *	.02½
Sherman & Roony	.03
30,000 pounds fresh bread:	
R. & W. Franklin	.03¾
Jeremiah J. Lynch	.03¾
Simeon Davis*	.03½
180,000 gallons water:	
Lawton Coggeshall*	.00⅝

NAVY-YARD, NEW YORK.

170,000 pounds fresh beef:	
William J. Barker	.06½
James J. Lyons	.10
William J. Belford	.09¾
Lindenstein & Co	.06¼
John Hanley * †	.06¼
William H. Belford	.06½
170,000 pounds fresh vegetables:	
William J. Barker	.00$\frac{85}{100}$
James J Lyons	.03
William J. Belford	.03⅛
Lindenstein & Co	.00⅞
John Hanly*†	.00⅞
M. Galway	.03
William H. Belford	.01½
130,000 pounds fresh bread:	
R. T. Smith & Co	.03¾
William J. Belford	.03⅜
William Bunge *	.02½
Antoine Behlen	.03½
John McNamara	.03½
William H. Belford	.03⅜
260,000 pounds biscuit	
James D. Mason & Co	.03$\frac{65}{100}$
Charles T. Goodwin & Son, in barrels	.03$\frac{4}{10}$
Charles T. Goodwin & Son, in tins	.05$\frac{4}{10}$
George C. Stickney	.04⅛
Hatfield & Ducker, in barrels	.03$\frac{48}{100}$
Hatfield & Ducker, in tins	.05$\frac{48}{100}$
William J. Belford	.03$\frac{47}{100}$
William H. Belford	.03$\frac{47}{100}$
4,500,000 gallons of water (per hundred):	
William J. Belford *†	.01⅝
William H. Belford	.01⅝
64,675 pounds of ice (per hundred)	
William J. Belford *	.50
Knickerbocker Ice Company	.65

NAVY-YARD, LEAGUE ISLAND, PA.

8,000 pounds fresh beef:	
L. Shuster Boraef *	12
8,000 pounds fresh vegetables:	
L. Shuster Boraef *	.04½
72,616 pounds of ice:	
Knickerbocker Ice Company*	.00¼

NAVAL ACADEMY, ANNAPOLIS, MD.

10,000 pounds fresh beef:	
Jackson Brewer *	.08
10,000 pounds fresh vegetables:	
Jackson Brewer*	.04

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* Accepted. † Decided by lot.

NAVAL ACADEMY, ANNAPOLIS, MD.—continued.

8,000 pounds fresh bread:	
Martin M. Smith*	$0.03¼
134,000 pounds ice (per hundred):	
Joseph S. M. Basil*	.23¼

NAVY-YARD, WASHINGTON, D. C.

3,500 pounds fresh beef:	
Charles C. Carroll*	.04
F. G. Alexander	.06
3,500 pounds fresh vegetables:	
Charles C. Carroll*	.01
F. G. Alexander	.01¼
51,000 pounds ice—per hundred:	
Independent Ice Company*	.40

NAVY-YARD, NORFOLK.

80,000 pounds fresh beef:	
Dusch & Stosser	.05$\frac{7}{10}$
Lewis Wasserman	.05$\frac{60}{100}$
William J. Garrity	.05$\frac{44}{100}$
Baum & Biddle*	.05$\frac{47}{100}$
Samuel Westheimer	.06$\frac{24}{100}$
Isaac Gutman	.06¼
80,000 pounds fresh vegetables:	
Dusch & Stosser	.01$\frac{5}{10}$
Lewis Wasserman	.01$\frac{34}{100}$
Wm. J. Garrity	.01$\frac{76}{100}$
Baum & Biddle*	.01$\frac{23}{100}$
Samuel Westheimer	.01$\frac{85}{100}$
Isaac Gutman	.01$\frac{75}{100}$
70,000 pounds fresh bread:	
C. I. Cabler	.03¼
James Reid & Co	.03¼
James G. Anderson*	.03$\frac{15}{100}$
80,000 pounds biscuit:	
James Reid & Co	.04
Charles T. Goodwin & Son { in barrels	.03$\frac{80}{100}$
Charles T. Goodwin & Son { in tins	.06$\frac{40}{100}$
James D. Mason & Co.,* in barrels	.03$\frac{68}{100}$
50,000 pounds ice:	
John K. Gann*	.01

NAVAL STATION, KEY WEST, FLA.

5,000 pounds fresh beef:	
S. O. Johnson†	.12
5,000 pounds of fresh vegetables:	
S. O. Johnson†	.05
3,800 pounds of fresh bread:	
S. O. Johnson†	.10
7,300 pounds ice:	
S. O. Johnson†	.01

NAVY-YARD, PENSACOLA, FLA.

3,000 pounds fresh beef:	
John S. Bell*	.14
3,000 pounds fresh vegetables:	
John S. Bell*	.06
2,400 pounds fresh bread:	
Moses White*	.06
42,560 pounds ice:	
E. E. Saunders & Co.*	.01

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* Accepted. † Informal.

NAVY-YARD, MARE ISLAND, CAL.

50,000 pounds fresh beef:	
Samuel Brown	$0.07½
Jacob Stutz	.08¼
James McCudden *	.07$\frac{49}{100}$
Mark Strouse	.07$\frac{45}{100}$
50,000 pounds fresh vegetables:	
Samuel Brown	.02
Jacob Stutz	.01½
James McCudden *	.01
Mark Strouse	.01$\frac{95}{100}$
40,000 pounds fresh bread:	
Joseph Boss	.03¾
James McCudden *	.03¼
D. T. Brown, jr	.03⅝
75,000 pounds biscuit:	
American Biscuit Co.* in tins	.06
American Biscuit Co.* in barrels	.05¾
J. C. Chadbourne in tins	.06¼
J. C. Chadbourne in barrels	.06
29,000 pounds ice:	
Henry Connolly	.03
James McCudden *	.02¼

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*Accepted.

REPORT

OF THE

CHIEF OF BUREAU OF MEDICINE AND SURGERY.

NAVY DEPARTMEN
BUREAU OF MEDICINE AND SURGERY,
Washington, October 9, 1890.

SIR: I have the honor to submit the statistical report of the health of the Navy for the year 1889, together with estimates for the fiscal year ending June 30, 1892, the condition of the Naval Hospital fund, and the naval medical establishments.

NAVAL HOSPITALS, SANATORIUM, SICK QUARTERS, AND NAVY-YARDS.

The usual visit of inspection was made to the principal naval medical establishments on the Atlantic coast.

Widow's Island, Penobscot Bay, Maine.—This hospital, erected for the purpose of receiving the sick from ships infected with yellow fever, is kept in readiness for their admission, and a contract is made each year for supplies whenever required. About 40 square feet of sod and several tons of rock have fallen off this spring on the north end of the island. Certain repairs to the building have been necessitated by its exposed situation, chiefly painting, pointing with cement, stopping leaks, repairing and renewing defective piping. The improvements are an iron tank with a capacity of 9,000 gallons, built in the southeast corner of the basement, connected with the roof and gutters by galvanized iron piping from each side led through the walls, and tank connected with the pipe leading from the well to the attic; an ice-house; a scow built of seasoned oak of a size sufficient to carry a yoke of oxen with all the necessary articles for working on the island; a patch of ground prepared for locating the Ducker pavilion hospitals.

Portsmouth, N. H., navy-yard.—A contract was made, after due advertisement, with Messrs. J. & J. Philbrook, of Portland, Me., for the construction of new sick quarters on Seavy's Island, adjoining the navy-yard, for the sum of $38,967.

The work has commenced under the immediate supervision of Civil Engineer Prindle.

Chelsea, Mass.—This hospital maintains its excellent condition. The chief repairs and improvements are an antiseptic operating-room; new stand-pipe and hose on every floor for extinguishing fire; new roof to some of the outbuildings; old drains under floor in cellar closed, and floor cemented; 200 yards blind drain laid in cemetery; new walk from gate to director's house, and thence to front and rear of hospital; sanitary improvements in director's house.

Boston, Mass., navy-yard.—The recommendation heretofore made is renewed for the dispensary to be located at a more central point than at present, and in the vicinity of the barracks, prison, and forge, whence come the sick and injured. The new dispensary should have a room properly fitted for the first treatment of sick and injured workmen from the yard and marines from the barracks. The large privy vault near the prison entrances should be permanently closed and connection made with the sewer.

Brooklyn, N. Y.—The marked improvement of the hospital has continued. The main repairs and improvements are an antiseptic operating-room; repainting of hospital and buildings; furniture repaired and recovered; gas-fixtures renewed; wire screen division in hammock-room; two flagstone floors laid in basement; chimney at steam building repaired; vault repaired in cemetery; placing iron name-plates over 100 graves; sidewalk built and curbstone laid the whole length of lane from Flushing avenue to cemetery. A contract was made, after due advertisement, with the Q. N. Evans Construction Company, of New York, for the sum of $6,347, to repair and renew the steam-heating apparatus at the hospital, by means of which the residence of the director of the laboratory was to be added to the system. The work has been satisfactorily completed in accordance with the specifications of the Bureau, and the apparatus tested with steam of 30 pounds pressure. At the last session of Congress the sum of $5,000 was appropriated "for construction of a laundry and drying-room at the Naval Hospital, New York, in full for all expenses of erecting the building and supplying machinery and fittings." Plans and specifications have been made by the civil engineer of the Bureau of Yards and Docks, and advertisement will be made for proposals for the construction of the building.

Naval laboratory.—The efficiency of the general purveying and distributing establishment for medical stores and appliances has been maintained during the past year. The prompt attention given to the filling of requisitions and the provision made to meet emergencies have characterized its management. Repairs and painting of cornices, roofs, and outside wood-work of the buildings included in the laboratory establment are now in progress. The residence of the director has been repainted and repapered.

Navy-yard chemical laboratory.—Medical Inspector McMurtrie reports: "In the chemical laboratory attached to the surgeon's office at the navy-yard samples of supplies have been submitted and passed upon as follows: Alcohol, 5; candles, 2; chrome green, 1; fluor spar, 1; glycerine, 3; lead, black, in oil, 1; lead, red, in oil, 1; lead, sugar of, 1; lead, white, in oil, 10; oil, cylinder, 2; oil, linseed, boiled, 4; oil, sperm, 1; soap, salt-water, 2; tobacco, plug, 2; turpentine, 2; varnish, turpentine asphalt, 6; varnish, asphalt, 1; varnish, black, 3; vinegar, 4; vinegar on pickles, 3; zinc, white, in oil, 7; total, 62."

Philadelphia, Pa., Naval Hospital.—The condition has improved. The outside of building, including brick, stone, tin, and wood work, has been thoroughly repaired and painted; old chimneys taken down and rebuilt; basement newly floored; steam-boilers and heating apparatus extensively repaired; auxiliary boiler and engine for laundry and hot-water purposes; new Worthington steam-pump; dispensary renovated and newly equipped; furniture repaired, re-upholstered, or renewed. The recommendation made last year for an elevator to be placed in the Naval Home has been carried into effect.

League Island navy-yard.—The repairs recommended in the Bureau's report of last year have been made. The surgeon's office and dispensary have been painted, fitted, and supplied with new furniture. The navy-yard has been provided with a new ambulance (army pattern) by the Bureau of Yards and Docks.

Annapolis, Md.—The sick quarters are in good condition; only minor alterations or improvements have been made. The water-closets for cadets are in old buildings, detached from their quarters and without modern appliances, being kept in order with difficulty. The recommendation made in the last annual report of the Bureau is repeated for the erection of a suitable structure to contain a system of the most approved water-closets and ventilators, and the old buildings destroyed.

Washington, D. C.—The condition of the Naval Hospital is satisfactory. The improvements and replacements are, a new boiler, steam chest and cylinder, a wrought-iron grating cell door, and new water-closet tanks.

Norfolk, Va.—The occupied portion of the Naval Hospital is kept in fine order. Among the repairs and improvements made, are the entire front of building cleansed and repainted; outer walls and cornices of northeast and northwest corners pointed with cement and painted; gas, steam, and hot-water pipes relaid; gate house painted and kitchen added; a greenhouse, foot bridge, and abutment; semi-circular abutment and pier; new fence around vegetable garden; Green street main entrance regraded and reshelled; roads and walks through grounds; pest-house thoroughly repaired and repainted; cemetery put in order; new head stones or boards set up or renewed; defaced inscriptions relettered, and walks graded. In addition to water afforded by wells and cisterns, an ample supply is contracted for by the Portsmouth and Suffolk Water Company. With the desire to have the sanitary benefits given by electric lighting and to be exempt from large gas bills, estimates have been invited from Citizen's Light, Heat, and Power Company at Portsmouth, Va., for the cost of introduction and supply of electric lighting.

Pensacola, Fla.—The sick quarters are in a fair condition. No repairs to the buildings have been required. Repairing and making new brick walks, leveling grounds, and keeping the buildings in good order comprise the work done.

Mare Island, Cal.—The condition of the hospital is good. The most important repairs and improvements made during the year are: Painting, the substitution of water-closets and iron bedsteads by those of better form, repairing and painting outbuildings, laying water pipes, and repairing water-main. The grounds have been improved by cutting out superfluous trees, extending the kitchen garden, and changing the locality of the hot-house. A Ducker portable field hospital has been substituted for the pest-house, now in ruins. About 200 head-boards have been repainted, lettered, and reset, and the inclosure cleaned and put in order. Estimates are again submitted for the construction of a residence for the medical director in charge, at a cost of $15,500 in full for all expenses of erecting and making necessary improvements about the grounds, and I beg leave, respectfully, to call to your attention, the necessity for this appropriation. The Mare Island Hospital is the only naval hospital on the Pacific coast; to it are sent patients from the Mare Island navy-yard, receiving-ship, marine barracks, from vessels of the Pacific and Asiatic stations, and from the vessel at Sitka. At times the hospital is filled to its utmost capacity and the patients are uncomfortably crowded; this for the reason that one of the wards is necessarily occupied by the medical director in charge as his quarters, since no other quarters are provided for him. At all the naval hospitals, with the exception of the small hospital at Washington, residences are provided for the medical director in charge, leaving the hospital free for the use of patients and the junior medical officers. It is the desire of the Bureau to place the Mare Island Hospital on the same footing as the other hospitals for the care and welfare of the sick, and to increase its accommodations, and this appropriation is urgently recommended.

Sitka, Alaska.—A portion of the naval storehouse is set apart for sick quarters, to which the sick from the U. S. S. *Pinta* and marine guard at Sitka, are sent. The commanding officer having recommended certain repairs and improvements to the sick quarters, the Bureau has authorized the repairing and preparing the rooms, with additions, to be done at a sum not to exceed $500.

Yokohama, Japan, Naval Hospital.—The principal repairs and improvements made are: Outer walls of all buildings repainted and their roofs pointed and coal-tarred; plastering broken by repeated earthquake shocks removed and boarding and papering substituted; quarters of junior medical officer refitted; dispensary enlarged and re-equipped; patients mess-hall remodeled and refurnished, and a smoking and reading room for convalescents added; new stone steps and front walks finished with concrete and cement. Surgeon Gravatt urges the substitution of electric lighting for that of oil in lamps, on account of hygienic considerations, reduction of labor, cleanliness, and safety from fire in a building constructed of light inflammable material, and with no fire organization to call upon for assistance. The Bureau will ask for proposals to introduce and supply the electric light so soon as the Yokohama Union Electric Light Company is ready to operate.

MUSEUM OF HYGIENE.

A synopsis of the report of Medical Director Wales shows that the experience of each year is evidence of the necessity for such an institution, and by its growth and work a greater appreciation of its value is given. In the bacteriological and microscopical departments, diseased tissues and morbid products have been examined and opinions given; there was an increase of one hundred and thirteen analyses over last year, consisting in part of mineral and potable waters, air, proprietary medicines, fluid extracts, tinctures, wall-paper for arsenic, concentrated foods, soaps, paints, etc.; certain investigations have been made and are still in progress.

The laboratory has been greatly improved by an increased supply of gas, and the completion of the furnace and combustion room. It is now capable of undertaking analyses for any bureau in the Navy.

The library has slowly increased; one hundred and eighteen new books have been added, a want of funds having prevented a larger growth. A catalogue of the library is needed, and a sum is desired for that purpose.

The exhibits have been rearranged, adding to their accessibility and appearance, and giving room for others; twenty-six specimens have been added, illustrating sanitary science.

The increase in the number of visitors, and the inquiries made by medical men, architects, builders, and manufacturers are sure indications of the growing appreciation on the part of the public.

An endeavor is being made to complete the sanitary history of each

State, with expectations for its realization. The impediment to the more rapid growth of the museum is deficiency in money and in workers to do the work that should be accomplished each year; until these two defects are remedied its growth will be slow.

INTERNATIONAL MEDICAL CONGRESS.

Medical Directors Gihon and Kindleberger were appointed delegates by the honorable Secretary of the Navy to represent the Medical Department of the United States Navy, at the tenth International Medical Congress, held in Berlin, Germany, in August, 1890; also at the British Medical Association, held in Birmingham, England, in July, 1890. Their reports are transmitted herewith.

VACANCIES IN THE MEDICAL CORPS.

The Bureau has to regret that vacancies, which have been present in the medical corps since the termination of the civil war, are yet unfilled.

A bill for the improvement of assistant surgeons, in rank and pay, receiving the recommendation of the Department, was presented to Congress without successful result. In addition to eight vacancies in October, 1889, five have occurred during the year; two by death, two by retirement, and one by resignation. Nine assistant surgeons have entered. At present there are four vacancies.

Two candidates appeared before the medical examining board at the Naval Hospital, Mare Island, Cal.; one was accepted and one was rejected. The Board was discontinued, as no other candidates reported for examination.

The medical examining board at the Naval Hospital, Brooklyn, has continued and is now in session.

PENSION CASES.

Number of pension cases remaining on hand June 30, 1889	62
Number received during fiscal year ending June 30, 1890	3,082
Number answered during fiscal year ending June 30, 1890	2,937
Number remaining on hand June 30, 1890	207

ENLISTMENTS.

The number of persons examined for the naval service, including apprentice boys, during the year 1889, was 13,444; of this number, 4,896, or more than one-third, were rejected for physical disqualifications. The number of these rejected for color-blindness was 176, a ratio of 13+ in 1,000.

SICK OF THE NAVY.

The number of patients admitted to the sick list and under treatment during the year 1889 was 12,029; of this number 8,102 were on vessels afloat and receiving-ships, 1,595 in hospitals, and 2,332 at navy-yards and shore stations.

The daily average of sick on vessels afloat was 165.31. The average each case was under treatment represented a loss of 7.44 days; 93.94 in 1,000 were invalided to hospitals, and 9.89 in 1,000 died.

MORTUARY RECORD.

The total number of deaths in the naval service during the year 1889 was 203; of this number 111 occurred on vessels afloat and receiving-ships, 70 at naval hospitals, and 22 at navy-yards and shore stations. The ratio was 18+ in 1,000 for the entire service.

INSANE OF THE NAVY.

There were ninety-one patients belonging to the Navy treated in the Government Hospital for the Insane in the District of Columbia for the year ended September 30, 1890.

Remaining in hospital September 30, 1889	66
Admitted during the year ending September 30, 1890	25
Total under treatment	91
Discharged during the year:	
Recovered	9
Improved	5
Died	12
On visit	1
	27
Remaining in hospital September 30, 1890:	
Officers	7
Enlisted men	57
	64

NAVAL HOSPITAL FUND.

The condition of this fund is as follows, viz:

Balance on hand October 1, 1889	$208,989.48
Transferred to the credit since October 1, 1889	70,377.05
Credit by appropriation, act June 30, 1890	20,000.00
	299,366.53
Expended since October 1, 1889	84,424.57
Balance on hand October 1, 1890	214,941.96

Very respectfully, your obedient servant,

JNO. MILLS BROWNE,
Surgeon-General, U. S. Navy.

Hon. B. F. TRACY,
Secretary of the Navy.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the Bureau of Medicine and Surgery, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
SALARIES.			
Chief Clerk, increase of $200 submitted (appropriated act of July 11, 1890)	$2,000.00		
One clerk of class three (same act)	1,600.00		
One clerk of class two (same act)	1,400.00		
One clerk of class two (appropriated act of August 29, 1890)	1,400.00		
One clerk of class one (same act)	1,200.00		
One clerk of class one (appropriated act of July 11, 1890)	1,200.00		
One clerk (same act)	1,000.00		
One assistant messenger (same act)	720.00		
One laborer (same act)	600.00		
One janitor for naval dispensary (same act)	660.00		
One laborer for naval dispensary (same act)	480.00		
		$12,260.00	$12,060.00
MEDICAL DEPARTMENT.			
For surgeons' necessaries for vessels in commission, navy-yards, naval stations, Marine Corps, and Coast Survey, and for the civil establishment at the several naval hospitals, navy-yards, naval laboratory, museum of hygiene, and Naval Academy (same act)	....	60,000.00	60,000.00
NAVAL HOSPITAL FUND.			
For maintenance of the naval hospitals at the various navy-yards and stations, and for care and maintenance of patients in other hospitals at home and abroad (same act)	....	20,000.00	20,000.00
CONTINGENT.			
For freight, expressage on medical stores; tolls; ferriages; transportation of insane patients and of sick to hospital; care, transportation, and burial of the dead; advertising; telegraphing; rent of telephones; purchase of books and stationery; binding of unbound books and pamphlets; postage and purchase of stamps for foreign service; expenses attending the Medical Board of Examiners; rent of rooms for naval dispensary and museum of hygiene; hygienic and sanitary investigation and illustration; sanitary and hygienic instruction; purchase and repairs of wagons and harness; purchase of and feed for horses and cows; trees, plants, garden tools, and seeds; furniture and incidental articles for the museum of hygiene; naval dispensary, Washington; naval laboratory, sick quarters at Naval Academy, and Marine barracks; surgeons' offices and dispensaries at navy-yards and naval stations; washing for Medical department at museum of hygiene, naval dispensary, Washington, naval laboratory, sick quarters at Naval Academy, and Marine barracks; dispensaries at navy-yards and naval stations, and ships and rendezvous; and all other necessary contingent expenses (same act)	....	25,000.00	25,000.00
REPAIRS.			
For necessary repairs of naval laboratory, Navy hospitals, and appendages, including roads, wharves, out-houses, sidewalks, fences, gardens, farms, and cemeteries (same act)	....	20,000.00	20,000.00
MEDICAL DIRECTOR'S RESIDENCE, NAVAL HOSPITAL, MARE ISLAND, CAL.			
For the construction of a residence for the medical director in charge of naval hospital, Mare Island, Cal., in full for all expenses of erecting and making necessary improvements about the grounds (submitted)	....	15,500.00	....

Force afloat—General aggregate, 1889.

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service.			
Morbid states and processes irrespective of parts affected	......	77	47	24	1	......	5	522
General diseases—dependent upon morbid poisons:								
Class 1	8	696	532	75	.....	12	85	5, 083
Class 2	4	515	481	31	4	3	......	3, 097
Class 3	......	21	14	6	.....	......	1	189
Class 4	8	456	349	103	1	1	10	4, 818
Dependent upon causes other than morbid poisons:								
Class 1	......	46	42	4	......	......	......	169
Class 2	1	141	134	5	......	1	2	423
Developmental diseases	......	5	2	......	3	......	......	76
Unclassified diseases	13	596	488	108	6	......	7	4, 925
Local diseases:								
Diseases of the nervous system	4	350	259	81	7	5	2	2, 294
Diseases of the eye	2	113	95	18	1	......	1	785
Diseases of the ear	......	62	44	14	2	......	2	473
Diseases of the nose	......	11	10	1	......	......	......	40
Diseases of the circulatory system	3	55	30	20	3	5	......	559
Diseases of the respiratory system	15	697	564	122	4	10	12	5, 351
Diseases of the digestive system	12	1, 218	1, 143	77	1	2	7	5, 511
Diseases of the lymphatic system	10	149	104	49	......	......	6	2, 617
Diseases ef the urinary system	2	38	24	12	......	1	3	348
Diseases of the generative system	13	328	278	52	......	......	11	3, 278
Diseases of the locomotor system	......	57	40	15	......	......	2	672
Diseases of the integumentary system	17	707	661	50	2	......	11	5, 858
Parasitic diseases	......	9	7	2	......	......	......	20
Poisons	3	22	24	......	......	1	......	149
Tumors and cysts—malignant or non-malignant.	......	9	7	2	......	......	......	114
Surgical operations	......	2	....	2	......	......	......	21
Injuries, etc	23	1, 582	1, 368	141	5	70	21	12, 033
Feigned diseases	......	2	2	......	......	......	.....	15
Total	138	7, 964	6, 749	1, 014	40	111	188	60, 340

Forces afloat—Detailed statement, 1889.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick-days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.								
Adynamia	......	69	46	19	......	......	4	415
Atrophia	......	1	....	1	......	......	......	1
Hydrops	......	2	....	2	......	......	......	42
Tuberculosis	......	5	1	2	1	......	1	64
GENERAL DISEASES DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemicus	......	240	156	5	......	......	79	703
Diphtheria	......	2	....	2	......	......	......	2
Dysenteria acuta	......	133	95	36	......	2	......	1, 282
Dysenteria chronica	......	3	3	......	......	......	......	21
Febris cerebro spinalis	......	3	3	......	......	......	......	7
Febris continua simplex	2	119	113	3	......	1	4	616
Febris enterica	1	28	11	12	......	5	1	810
Febris flava	3	4	2	2	......	3	......	74

Forces afloat—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
GENERAL DISEASES DEPENDENT UPON MORBID POISONS—Cont'd.								
Class 1—Continued.								
Febricula	.....	9	9	.....	.....	.....	.....	21
Febris typho-malarialis	.....	7	5	2	.....	.....	.....	273
Kaké (beri-beri)	.....	3	2	.....	.....	1	.....	31
Morbilli	2	16	12	6	.....	.....	.....	194
Parotitis	.....	60	57	3	.....	.....	.....	655
Pertussis	.....	1	1	.....	.....	.....	.....	4
Rubeola	.....	1	.....	1	.....	.....	.....	1
Scarlatina	.....	1	.....	1	.....	.....	.....	1
Vaccina	.....	65	62	2	.....	.....	1	378
Varicella	.....	1	1	.....	.....	.....	.....	10
Class 2.								
Cachexia malarialis	.....	14	9	5	.....	.....	.....	92
Febris intermittens	3	368	355	13	3	.....	.....	1,573
Febris remittens	1	133	117	13	1	3	.....	1,432
Class 3.								
Erysipelas	.....	20	14	5	.....	.....	1	166
Septicæmia	.....	1	.....	1	.....	.....	.....	23
Class 4.								
Gonorrhœa	2	176	154	17	.....	.....	7	1,749
Syphilis primitiva	.....	74	52	20	.....	.....	2	758
Syphilis consecutiva	6	206	143	66	1	1	1	2,311
GENERAL DISEASES DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Aërum effectus	.....	16	15	1	.....	.....	.....	27
Caloris effectus	.....	29	26	3	.....	.....	.....	128
Frigoris effectus	.....	1	1	.....	.....	.....	.....	14
Class 2.								
Alcoholismus	1	141	134	5	.....	1	2	423
DEVELOPMENTAL DISEASES.								
Senectus	.....	5	2	.....	3	.....	.....	76
UNCLASSIFIED DISEASES.								
Anæmia	.....	6	4	2	.....	.....	.....	38
Cellulitis	.....	1	1	.....	.....	.....	.....	9
Diabetes	.....	2	.....	2	.....	.....	.....	10
Debilitas	.....	1	1	.....	.....	.....	.....	5
Lumbago	.....	12	11	1	.....	.....	.....	68
Œdema	.....	1	.....	1	.....	.....	.....	20
Pleuro-dynia	.....	3	2	1	.....	.....	.....	18
Podagra	1	18	17	1	1	.....	.....	125
Rheumatismus	8	446	366	78	5	.....	5	3,481
Rheumatismus acutus	4	100	80	22	.....	.....	2	1,136
Rheumatismus chronica	.....	2	2	.....	.....	.....	.....	5
Scrofula	.....	1	1	.....	.....	.....	.....	1
Torticollis	.....	3	3	.....	.....	.....	.....	9
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia	.....	3	.....	.....	1	2	.....	5
Cephalalgia	.....	72	67	5	.....	.....	.....	280
Chorea	.....	2	.....	2	.....	.....	.....	9
Convulsio	.....	8	4	4	.....	.....	.....	61

Forces afloat—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—Continued.								
Diseases of the nervous system—Continued.								
Dementia		8	3	5				222
Congestio cerebri		1				1		1
Epilepsia	1	29	12	14	4			149
Hypochondriasis		1		1				2
Imbecillitas		1		1				1
Insomnia		3	2	1				4
Irritatio spinalis		4		4				47
Locomotor ataxia		1		1				3
Mania		6	2	3	1			28
Melancholia	1	13	5	8		1		212
Meningitis		2	1			1		15
Myelitis		1	1					22
Nausea marina		21	19	2				59
Neuralgia	2	119	108	13				609
Neurasthenia		14	7	6			1	80
Neuritis		2	1	1				13
Paralysis		17	7	8	1		1	288
Sciatica		2	2					46
Vertigo		20	18	2				78
Diseases of the eye.								
Amblyopia		1		1				11
Amaurosis		1		1				1
Asthenopia		3	2	1				41
Astigmatism		1			1			2
Blepharitis		3	3					19
Cataracta		2		2				16
Conjunctivitis	2	64	63	3				314
Hordeolum		6	6					8
Iritis		13	10	3				163
Keratitis		2	1	1				30
Mydriasis		1	1					5
Ophthalmia		7	4	2			1	55
Pterygium		2	1	1				2
Trachoma		1		1				1
Ulcus corneæ		6	4	2				117
Diseases of the ear.								
Otalgia		10	8	2				43
Otitis		33	23	10				212
Otorrhœa		7	5				2	67
Surditas		12	8	2	2			151
Diseases of the nose.								
Catarrhus nasalis		8	8					21
Epistaxis		3	2	1				19
Diseases of the circulatory system.								
Aneurysma		1	1					33
Angina pectoris		7	5	2				53
Dilatatio cordis		2		2				18
Hypertrophia cordis		2		2				10
Morbi valvularum cordis	2	22	8	9	2	5		256
Palpitatio		18	14	3	1			157
Pericarditis	1		1					1
Phlebitis		2	1	1				16
Varix		1		1				16
Diseases of the respiratory system.								
Asthma	1	11	8	3	1			97
Bronchitis acuta	7	209	188	23		2	3	1,404
Bronchitis chronica		32	21	11				281
Catarrhus	3	237	231	7	1		1	967
Coryza		2	2					16
Foreign body in larynx		1	1					23
Gangræna		1				1		1

Forces afloat—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—Continued.								
Diseases of the respiratory system—Cont'd.								
Hæmoptysis		10	6	3		1		108
Laryngitis		41	37	4				187
Phthisis pneumonica acuta		5		5				225
Phthisis pneumonica chronica	3	21	6	14	1	2	1	479
Pleuritis		33	24	6			3	369
Pneumonia	1	92	39	45	1	4	4	1, 168
Pneumo-thorax phthisis		2	1	1				4
Diseases of the digestive system.								
Caries dentium		5	4		1			23
Odontalgia		9	9					23
Parulis		6	6					19
Ascites		2		2				9
Cholera morbus		63	63					123
Colica	2	113	114	1				846
Colica hepatica		2	2					9
Congestio hepatis		1	1					3
Constipatio	2	34	31	5				169
Dyspepsia	1	37	36	2				331
Diarrhœa acuta	2	391	387	4		1	1	1, 375
Diarrhœa chronica		16	10	6				246
Enteritis		22	22					233
Fistula in ano		12	7	5				81
Gastralgia		1	1					2
Gastritis		20	18	2				88
Gastrodynia		2	2					5
Gastro-enteritis		1	1					48
Glossitis		1	1					3
Hæmatemesis		3	3					12
Hæmorrhois	3	39	30	12				249
Hepatitis acuta		4	4					31
Hepatitis chronica		5	4				1	49
Icterus		15	10	5				144
Œsophagitis		1	1					4
Peritonitis		3		2		1		14
Pharyngitis		51	46	5				241
Prolapsus ani		1	1					2
Stomatitis		2	2					12
Tonsillitis	2	347	322	23			4	1, 552
Typhlitis		8	5	2			1	54
Ulcus gastric		1		1				11
Diseases of the lymphatic system.								
Adenitis	10	144	100	48			6	2, 536
Lymphangitis		3	2	1				32
Splenitis		2	2					49
Diseases of the urinary system.								
Albuminuria		2		1			1	17
Azoturia		1	1					21
Calculus		7	4	1			2	47
Colica nephritica		2	2					6
Cystitis	1	15	13	3				211
Dysuria		1		1				1
Enuresis	1	3	1	3				16
Hæmaturia		3	1	2				18
Ischuria		2	1	1				6
Nephritis		2	1			1		5
Diseases of the generative system.								
Balanitis		16	12	4				98
Chancroides	7	91	79	13			6	1, 125
Epididymitis		3	3					15
Hydrocele		5	2	3				17
Orchitis	3	157	130	25			5	1, 538
Paraphymosis	2	9	10	1				120
Phymosis		11	11					120
Stimatosis		1	1					9
Spermatitis ac.		1	1					10
Urethræ strictura	1	25	20	6				155
Urethritis		3	3					20
Varicocele		6	6					42

Forces afloat—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—Continued.								
Diseases of the locomotor system.								
Ankylosis		11	7	4				137
Arthritis		7	3	4				54
Bursitis		5	5					37
Caries		1	1					10
Periostitis		4	4					85
Synovitis		27	19	6			2	300
Talipes equinus		1		1				46
Thecitis		1	1					3
Diseases of the integumentary system.								
Abscessus	8	250	244	11	1		2	2,030
Acne		2	2					15
Anthrax	1	9	10					137
Cellulitis		1		1				2
Dermatitis		3	3					23
Ecthyma		1	1					4
Eczema	1	29	24	6				280
Erythema		14	14					77
Furunculus	2	179	178		1		2	1,049
Herpes		6	6					34
Lichen		9	9					41
Onychia	1	6	7					38
Paronychia	1	35	32	1			3	399
Pemphigus		7	7					55
Pernio		1					1	16
Prurigo		1	1					21
Psoriasis		2		2				2
Purpura hemorrhagica		2	2					13
Rupia	1	1		2				27
Scabies		14	11	3				95
Tænia		3	2	1				11
Tinea		2	2					12
Ulcus	2	113	90	23			2	1,3[illegible]9
Unguis involutus		9	9					94
Urticaria		5	5					26
Verruca		3	2				1	18
PARASITIC DISEASES.								
Pediculi pubis		1	1					2
Vermes		8	6	2				18
POISONS.								
Chloral poisoning		1				1		1
Colica pictonum	1	2	3					28
Vulnus venenatum	2	19	21					120
TUMORS AND CYSTS (MALIGNANT OR NON-MALIGNANT).								
Adenoma		1	1					8
Condyloma		1	1					10
Cystis		4	3	1				67
External urethrotomy		1	1					9
Lipoma		1		1				8
Papuloma		1	1					12
SURGICAL OPERATIONS.								
Amputatio		2		2				21
INJURIES, ETC.								
Abrasio		58	55				3	408
Ambustio	1	59	59				1	498
Concussio		27	21	5		1		145
Contusio	3	372	362	11			2	2,473
Dislocatio		1	1					4
Fractura	4	94	48	41	2	3	4	1,708

Forces afloat—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
INJURIES, ETC.—Continued.								
Hernia	1	48	18	28	2		1	583
Luxatio		17	12	4		1		152
Sectis tendinum		1			1			8
Stremma	9	322	313	15			3	2,273
Submersio		62	2			60		64
Sucidium		1				1		1
Vulnus contusum	1	140	134	6			1	1,068
Vulnus incisum	2	141	129	11		1	2	1,292
Vulnus laceratum	2	172	156	14			4	1,843
Vulnus punctum		57	55	2				323
Vulnus sclopetarium		10	3	4		3		95
FEIGNED DISEASES.								
Aphonia		1	1					1
Surditas		1	1					14
Total	138	7,964	6,749	1,014	40	111	188	60,340

Navy-yards and stations—general aggregate, 1889.

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service.			
Morbid states and processes irrespective of parts affected	1	31	25	4		1	2	620
General diseases—dependent upon morbid poisons:								
Class 1	2	143	109	7		1	28	896
Class 2		130	116	8			6	702
Class 3		4	1	1		1	1	48
Class 4	1	112	61	49			3	1,203
Dependent upon causes other than morbid poisons:								
Class 1		3	3					78
Class 2		68	57	10			1	263
Developmental diseases								
Unclassified diseases	3	156	132	22	1		4	1,324
Local diseases:								
Diseases of the nervous system	1	197	173	16	1	4	4	1,022
Diseases of the eye		34	31	2			1	366
Diseases of the ear		9	7	1			1	132
Diseases of the nose		2	2					15
Diseases of the circulatory system	4	31	21	8	3	3		599
Diseases of the respiratory system	5	340	286	31	1	4	23	2,332
Diseases of the digestive system	9	564	543	24		1	5	2,641
Diseases of the lymphatic system		17	9	7			1	232
Diseases of the urinary system	1	16	10	2	1	1	3	494
Diseases of the generative system		42	29	12			1	585
Diseases of the locomotor system	1	10	8	2	1			233
Diseases of the integumentary system	4	127	114	14	1		2	1,203
Parasitic diseases		1		1				3
Poisons		1	1					4
Tumors and cysts—malignant or non-malignant		5	4			1		295
Surgical operations								
Injuries, etc	5	261	228	22		5	11	2,123
Feigned diseases		1	1					1
Total	37	2,305	1,971	243	9	22	97	17,414

Navy-yards and stations—Detailed statement, 1889.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.								
Adynamia		30	24	3		1	2	560
Degeneratio	1		1					59
Hydrops		1		1				1
GENERAL DISEASES, DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemicus		49	26	1			22	141
Dysenteria acuta		4	3				1	25
Febris continua simplex		20	15				5	146
Febris enterica	1	1	1			1		30
Morbilli		4	1	3				19
Parotitis	1	22	20	3				250
Roseola		1	1					3
Vaccina		42	42					282
Class 2.								
Cachexia malarialis		7	5				2	63
Febris intermittens		105	93	8			4	487
Febris remittens		18	18					152
Class 3.								
Erysipelas		3	1	1			1	27
Septicæmia		1				1		21
Class 4.								
Gonorrhœa	1	82	46	34			3	874
Syphilis primitiva		11	2	9				36
Syphilis consecutiva		19	13	6				293
GENERAL DISEASES, DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Caloris effectus		2	2					3
Frigoris effectus		1	1					75
Class 2.								
Alcoholismus		68	57	10			1	263
UNCLASSIFIED DISEASES.								
Anæmia		2		2				2
Diabetes		1	1					59
Lumbago		3	3					6
Podagra		2	1				1	32
Rheumatismus	2	116	100	14	1		3	991
Rheumatismus acutus	1	32	27	6				234
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia	1	6	5	2				160
Cephalalgia		76	74				2	191
Convulsio		5	4	1				24
Dementia		5		4	1			7
Epilepsia		7	4	3				15
Hysteria		1		1				3
Insomnia		1	1					9
Locomotor ataxia		1		1				1
Mania		2		2				3
Melancholia		1		1				1

Navy-yards and stations—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided. To hospital.	Invalided. From service.	Died.	Continued to next quarter.	Total number of sick days.
LOCAL DISEASES—Continued.								
Diseases of the nervous system—continued.								
Neuralgia		55	53				1	314
Neuritis		1				1		8
Paralysis		5	2			2	1	114
Tetanus		1				1		1
Vertigo		30	30					171
Diseases of the eye.								
Asthenopia		4	4					90
Conjunctivitis		22	20	2				149
Diplopia		1					1	74
Hordeolum		4	4					7
Iritis		2	2					21
Myopia		1	1					25
Diseases of the ear.								
Otalgia		3	3					18
Otitis		3	1	1			1	60
Otorrhœa		2	2					13
Surditas		1	1					46
Diseases of the nose.								
Catarrhus nasalis		1	1					6
Ozæna		1	1					9
Diseases of the circulatory system.								
Aneurysma	1	3	3	1				34
Angina pectoris		4	3			1		93
Hypertrophia cordis		3	1	2				82
Morbi valvularum cordis	1	4	1	2		2		102
Palpitatio	1	11	7	2	3			209
Pericarditis		3	2	1				64
Phlebitis		1	1					5
Varix	1	2	3					60
Diseases of the respiratory system.								
Asthma		9	5	4				34
Bronchitis acuta	1	83	73	4			7	502
Bronchitis chronica	1	19	14	6				215
Catarrhus		161	153	2			6	612
Emphysema		2	1	1				11
Hæmoptysis	1	7	5	1		1	1	49
Influenza		5					5	13
Laryngitis		17	17					116
Phthisis pneumonica chronica	2	9	3	5	1		2	493
Pleuritis		12	9	1		1	1	106
Pneumonia		16	6	7		2	1	181
Diseases of the digestive system.								
Caries dentium		1	1					1
Odontalgia		7	7					18
Parulis		1	1					4
Cholera morbus		13	13					38
Colica		50	49	1				157
Constipatio	1	43	43	1				128
Congestio hepatis	1	2	3					69
Dyspepsia	1	23	21	2			1	110
Diarrhœa acuta	1	183	180	2			2	571
Diarrhœa chronica		7	5	2				225
Enteritis		2	2					13
Fissure in ano		2	2					18
Fistula in ano		5	2	2			1	112
Gastritis		5	4				1	42
Gastrodynia		1	1					7
Hæmatemesis		2	2					12
Hæmorrhois		14	9	5				183

Navy-yards and stations—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—Continued.								
Diseases of the digestive system—Continued.								
Hepatitis acuta		1				1		10
Hepatitis chronica		1	1					69
Icterus	1	7	8					154
Pharyngitis		94	93	1				313
Rhagades ani		1	1					5
Stomatitis		2	2					6
Tonsilitis	3	97	92	8				425
Ulcus ventriculi	1		1					8
Diseases of the lymphatic system.								
Adenitis		17	9	7			1	232
Diseases of the urinary system.								
Albuminuria		1					1	77
Calculus		1	1					1
Cystitis		9	5	1		1	2	298
Dysuria		1	1					2
Enuresis		3	3					24
Nephritis		1		1				1
Urethral fistula	1				1			91
Diseases of the generative system.								
Balanitis		5	5					29
Chancroides		10	8	2				109
Fistula urinaria		1		1				1
Hydrocele		1	1					11
Orchitis		13	6	7				165
Phymosis		3	3					35
Prostatitis		1	1					14
Urethræ strictura		4	2	2				57
Varicocele		4	3				1	104
Diseases of the locomotor system.								
Arthritis		2		1	1			41
Necrosis	1		1					49
Periostitis		1	1					10
Synovitis		7	6	1				133
Diseases of the integumentary system.								
Abscessus		34	32	2				200
Anthrax		7	5	1			1	209
Bullæ		1	1					1
Callositas		2	2					8
Clavus	1	3	4					13
Dermatitis venenata		1	1					4
Eczema		19	11	7			1	123
Eczema and dementia		1		1				1
Erythema		1	1					2
Furunculus	2	33	34	1				194
Herpes		1	1					19
Onychia		1		1				1
Paronychia		4	4					31
Ptyriasis		2	2					27
Tinea		2	2					16
Ulcus	1	8	8		1			260
Unguis involutus		4	4					12
Urticaria		1	1					2
Verruca		2	1	1				11
PARASITIC DISEASES.								
Vermes		1		1				8
POISONS.								
Venenatio		1	1					4
TUMORS AND CYSTS (MALIGNANT OR NON-MALIGNANT).								
Epithelioma		2	1			1		97
Fibroma		2	2					188
Verruca		1	1					10

Navy-yards and stations—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
INJURIES, ETC.								
Abrasio	2	25	27	......	......	......	......	123
Ambustio	......	5	4	......	......	......	1	27
Asphyxia	......	1	......	......	......	1	......	1
Concussio	......	2	2	......	......	......	......	79
Contusio	......	43	39	3	......	......	1	266
Contractio	......	1	1	......	......	......	......	5
Fractura	1	12	9	2	......	......	2	323
Hernia	1	9	8	1	......	......	1	38
Luxatio	......	2	1	1	......	......	......	4
Stremma	1	89	78	8	......	......	4	676
Submersio	......	2	......	......	......	2	......	2
Suicidium	......	1	......	......	......	1	......	1
Vulnus contusum	......	23	22	1	......	......	......	198
Vulnus incisum	......	15	12	3	......	......	......	93
Vulnus laceratum	......	25	21	3	......	......	1	268
Vulnus punctum	......	5	4	......	......	......	1	18
Vulnus sclopetarium	......	1	......	......	......	1	......	1
FEIGNED DISEASES.								
Rheumatismus	......	1	1	......	......	......	......	1
Total	37	2,305	1,971	243	9	22	97	17,414

Naval hospitals—General aggregate, 1889.

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service.			
Morbid states and processes irrespective of parts affected	2	26	17	......	6	3	2	1,211
General diseases, dependent upon morbid poisons:								
Class 1	2	55	45	2	......	......	10	2,110
Class 2	7	51	51	......	4	1	2	1,669
Class 3	......	10	7	......	......	2	1	261
Class 4	29	159	146	1	18	......	23	11,378
Dependent upon causes other than morbid poisons:								
Class 1	......	46	43	......	......	1	2	502
Class 2	2	7	7	......	......	1	1	429
Developmental diseases	1	6	6	......	......	......	1	706
Unclassified diseases	18	135	108	6	20	1	18	8,646
Local diseases:								
Diseases of the nervous system	14	113	57	20	23	6	21	6,766
Diseases of the eye	8	29	24	2	6	......	5	2,319
Diseases of the ear	......	15	14	......	1	......	......	800
Diseases of the nose	......	1	1	......	......	......	......	10
Diseases of the circulatory system	7	39	21	1	7	9	8	2,448
Diseases of the respiratory system	36	184	125	14	23	30	28	12,489
Diseases of the digestive system	9	120	107	2	6	2	12	5,306
Diseases of the lymphatic system	13	54	52	2	3	......	10	4,145
Diseases of the urinary system	4	24	15	1	4	4	4	1,693
Diseases of the generative system	11	69	64	3	1	......	12	4,683
Diseases of the locomotor system	2	16	14	......	1	......	3	1,186
Diseases of the integumentary system	12	64	58	1	4	......	13	3,443
Parasitic diseases	......	4	4	......	......	......	......	107
Tumors and cysts, malignant or non-malignant	......	8	2	......	1	5	......	241
Surgical operations	......	5	....	1	3	......	1	330
Injuries, etc	23	155	113	5	30	5	25	9,330
Total	200	1,395	1,101	61	161	70	202	82,208

Naval hospitals—Detailed statement, 1889.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.								
Adynamia	2	18	13	......	3	3	1	857
Asthenia	......	1	......	......	1	......	......	10
Atrophia	......	2	1	......	1	......	......	63
Hydrops	......	3	2	......	......	......	1	126
Tuberculosis	......	2	1	......	1	......	......	155
GENERAL DISEASES DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemicus	......	6	......	......	......	......	6	18
Diphtheria	......	1	......	......	......	......	1	23
Dysenteria acuta	......	14	14	......	......	......	......	598
Febris continua simplex	......	1	1	......	......	......	......	26
Febris enterica	2	11	9	1	......	......	3	809
Morbilli	......	11	10	1	......	......	......	326
Parotitis	......	6	6	......	......	......	......	88
Rubella	......	2	2	......	......	......	......	32
Scarlatina	......	1	1	......	......	......	......	142
Vaccina	......	2	2	......	......	......	......	48
Class 2.								
Cachexia malarialis	......	5	3	......	2	......	......	171
Febris intermittens	4	26	27	......	2	1	......	645
Febris remittens	3	20	21	......	......	......	2	853
Class 3.								
Erysipelas	......	10	7	......	......	2	1	261
Class 4.								
Gonorrhœa	5	58	57	......	1	......	5	2,580
Syphilis primitiva	3	36	29	......	3	......	7	2,442
Syphilis consecutiva	21	65	60	1	14	......	11	6,356
GENERAL DISEASES DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Caloris effectus	......	1	......	......	......	......	1	84
Frigoris effectus	......	45	43	......	......	1	1	418
Class 2.								
Alcoholismus	2	7	7	......	......	1	1	429
DEVELOPMENTAL DISEASES.								
Senectus	1	6	6	......	......	......	1	706
UNCLASSIFIED DISEASES.								
Anæmia	......	4	3	......	......	......	1	179
Diabetes	......	3	2	......	1	......	......	95
Lumbago	......	1	1	......	......	......	......	21
Podagra	1	2	2	......	1	......	......	54
Rheumatismus	12	93	70	5	15	1	14	5,967
Rheumatismus acutus	5	31	30	1	2	......	3	2,320
Scrofula	......	1	......	......	1	......	......	10
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia	......	1	1	......	......	......	......	115
Cephalalgia	......	5	4	......	1	......	......	212
Chorea	......	2	......	......	2	......	......	66

Naval hospitals—detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—Continued.								
Diseases of the nervous system—Continued.								
Convulsio		4	1		1		2	277
Dementia	3	22	7	9	4	2	3	1,293
Encephalitis		1				1		4
Epilepsia	2	18	6	2	9		3	712
Imbecillitas		1			1			22
Insolatio		1	1					1
Insomnia		1	1					89
Irritatio spinalis		1	1					42
Locomotor ataxia		2	1				1	84
Mania		6	2	4				188
Melancholia	3	9	5	4			3	577
Meningitis		1				1		4
Neuritis		1			1			56
Nausea marina		1			1			25
Neuralgia	1	15	10		2		4	1,193
Neurasthenia	1	5	5				1	314
Paralysis	3	10	7	1	1	2	2	700
Pleurodynia		1	1					3
Pachymeningitis	1						1	365
Rachialgia		1					1	288
Vertigo		4	4					136
Diseases of the eye.								
Amaurosis		2					2	246
Asthenopia		1	1					87
Astigmatism		1	1					6
Blepharitis		1	1					3
Cataracta		2	1				1	187
Conjunctivitis	1	8	8	1				231
Defective vision	1				1			43
Iritis		5	4				1	242
Keratitis	1	2	1		2			443
Ophthalmia		1	1					42
Ophthalmia-gonorrhoica	1		1					21
Pterygium		2	2					397
Retinitis	4	1	3		2			177
Trachoma		1					1	36
Ulcus corneæ		2		1	1			158
Diseases of the ear.								
Otalgia		2	2					67
Otitis		11	11					592
Surditas		2	1		1			141
Diseases of the nose.								
Epistaxis		1	1					10
Diseases of the circulatory system.								
Aneurysma		2				2		15
Angina pectoris	1	2	2		1			11
Hypertrophia cordis		5	3				2	246
Morbi valvularum cordis	3	20	9	1	2	7	4	1,551
Palpitatio	1	7	5		2		1	366
Pericarditis		1	1					37
Phlebitis		1			1			100
Varix	2	1	1		1		1	122
Diseases of the respiratory system.								
Asthma	3	6	4	1	4			885
Bronchitis acuta	4	22	22	2		1	1	918
Bronchitis chronica	8	23	16	2	4	3	6	2,058
Catarrhus	1	16	16	1				618
Congestio pulmonum		1				1		4
Emphysema	1	1			2			214
Empyema		1	1					153
Hæmoptysis	1	5	3	1		1	1	158

Naval hospitals—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—Continued.								
Diseases of the respiratory system—Continued.								
Laryngitis	2	4	4	1	......	......	1	229
Phthisis pneumonica acuta	1	4	2	......	......	2	1	474
Phthisis pneumonica chronica	10	37	15	3	12	9	8	3,601
Pleuritis	2	12	7	1	1	3	2	492
Pneumonia	3	52	35	2	......	10	8	2,685
Diseases of the digestive system.								
Colica	......	3	3	......	......	......	......	64
Constipatio	......	12	9	......	1	1	1	491
Congestio hepatis	1	1	1	......	1	......	......	99
Cirrhosis hepatis	1	3	2	......	......	......	2	361
Dyspepsia	3	6	7	......	1	......	1	674
Diarrhœa acuta	1	8	8	......	1	......	......	232
Diarrhæa chronica	......	9	6	......	1	......	2	276
Enteritis	......	1	1	......	......	......	......	5
Fistula in ano	......	6	6	......	......	......	......	179
Gastritis	......	3	3	......	......	......	......	65
Gastric ulcer	......	1	......	......	1	......	......	44
Hæmorrhois	......	19	16	......	......	......	3	1,060
Hepatitis chronica	......	1	......	1	......	......	......	23
Icterus	......	4	4	......	......	......	......	175
Peritonitis	......	2	1	......	......	1	......	37
Pharyngitis	......	5	4	......	......	......	1	163
Recti strictura	1	1	2	......	......	......	......	324
Rhagades ani	......	1	1	......	......	......	......	21
Tonsilitis	2	31	30	1	......	......	2	864
Typhlitis	......	3	3	......	......	......	......	149
Diseases of the lymphatic system.								
Adenitis	13	53	51	2	3	......	10	4,098
Lymphangitis	......	1	1	......	......	......	......	47
Diseases of the urinary system.								
Albuminuria	......	3	......	......	1	1	1	187
Calculus	......	2	1	1	......	......	......	61
Cystitis	3	7	7	......	1	......	2	982
Enuresis,	......	4	3	......	......	......	1	50
Hæmaturia	......	2	1	......	1	......	......	191
Ischuria	......	1	1	......	......	......	......	64
Nephritis	......	4	1	......	......	3	......	99
Pyelitis	1	......	......	......	1	......	......	2
Succulatim of bladder	......	1	1	......	......	......	......	57
Diseases of the generative system.								
Chancroides	5	17	17	3	......	......	2	1,480
Fistula urethral	......	1	......	......	......	......	1	112
Hydrocele	......	2	2	......	......	......	......	24
Orchitis	2	34	31	......	......	......	5	1,760
Paraphymosis	2	1	3	......	......	......	......	54
Phymosis	......	1	1	......	......	......	......	21
Urethræ strictura	2	12	9	......	1	......	4	1,210
Varicocele	......	1	1	......	......	......	......	22
Diseases of the locomotor system.								
Ankylosis	......	2	2	......	......	......	......	216
Arthritis	......	6	4	......	1	......	1	396
Caries	......	1	1	......	......	......	......	107
Morbus coxarius	1	......	1	......	......	......	......	48
Synovitis	1	6	5	......	......	......	2	398
Talipes equinus	......	1	1	......	......	......	......	21
Diseases of the integumentary system.								
Abscessus	4	18	17	1	......	......	4	1,218
Acne	1	2	3	......	......	......	......	87
Clavus	......	1	1	......	......	......	......	2

Naval hospitals—Detailed statement, 1889—Continued.

Diseases.	Remaining from last quarter.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next quarter.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—Continued.								
Diseases of the integumentary system—Cont'd.								
Ecthyma	1		1					23
Eczema	2	15	15				2	617
Furunculus		1	1					11
Herpes		1	1					9
Onychia		1	1					76
Paronychia		1	1					30
Psoriasis		3	1		1		1	103
Scabies	1	3	3				1	168
Ulcus	3	17	12		3		5	1,086
Verruca		1	1					13
PARASITIC DISEASES.								
Vermes		4	4					107
TUMORS AND CYSTS (MALIGNANT OR NON-MALIGNANT).								
Adenoma		1			1			13
Carcinoma		4				4		106
Epithelioma		1				1		33
Lipoma		2	2					89
SURGICAL OPERATIONS.								
Amputatio		5		1	3		1	330
INJURIES, ETC.								
Ambustio		2	2					67
Concussio	2	3	4				1	140
Contusio	2	15	15				2	611
Fractura	8	42	32	2	7	2	7	3,112
Hernia	4	29	6	2	19		6	1,851
Injury to ankle		1			1			7
Luxatio		4	2		1		1	238
Stremma	4	22	22		1		3	1,804
Suicidium		1				1		1
Vulnus contusum	1	9	7	1			2	253
Vulnus incisum		9	7			1	1	340
Vulnus laceratum	1	13	13		1			622
Vulnus punctum		1	1					7
Vulnus sclopetarium	1	4	2			1	2	274
Total	200	1,395	1,101	61	161	70	202	82,208

Report of enlistments for the year 1889.

Number of persons examined for the naval service during the year 1889	13,444
Number accepted	8,546
Number rejected	4,896
Color blind	176
Rejected per thousand	364+
Color blind per thousand	13+

Report of vaccination.

	Successful.	Unsuccessful.
No evidence of previous vaccination	249	282
Presenting good cicatrices	1,346	3,251
Evidence of former attack of small-pox	18	93

Ratio per thousand of admissions for each class of disease of the force afloat.

Classification of diseases.	Ratio.
Morbid states and processes irrespective of parts affected	6.87
General diseases—Dependent upon morbid poisons:	
Class 1	62.75
Class 2	46.26
Class 3	1.87
Class 4	41.35
Dependent upon causes other than morbid poisons:	
Class 1	4.10
Class 2	12.65
Developmental diseases	.44
Unclassified diseases	54.28
Local diseases:	
Diseases of the nervous system	31.55
Diseases of the eye	10.25
Diseases of the ear	5.52
Diseases of the nose	.98
Local diseases—Continued:	
Diseases of the circulatory system	5.17
Diseases of the respiratory system	63.46
Diseases of the digestive system	109.63
Diseases of the lymphatic system	14.17
Diseases of the urinary system	8.56
Diseases of the generative system	30.39
Diseases of the locomotor system	5.08
Diseases of the integumentary system	64.58
PariSitic diseases	.80
Poisons	2.22
Tumors and cysts (malignant or non-malignant)	.80
Surgical operations	.17
Injuries, etc	143.05
Feigned diseases	.17
Total	722.16

SUMMARY FORCE AFLOAT.

Daily average number of sick	165.31
Average number of days each case was under treatment	7.44
Admissions per thousand of mean strength	722.16
Invaliding per thousand of mean strength	93.94
Deaths per thousand of mean strength	9.89

General statistics.

Mean strength of the Navy and Marine Corps, including officers and men, 1889:	
Officers of the Navy and Marine Corps on the active list	1,699
Enlisted men of the Navy	7,389
Enlisted men of the Marine Corps	2,131
Total	11,219
Total number of cases under treatment during the year 1889:	
Navy hospitals	1,595
Navy-yards and stations	2,332
Vessels afloat and receiving-ships	8,102
Total	12,029
Total number of deaths from all causes during the year ending 1889:	
Naval hospitals	70
Navy-yards and stations	22
Vessels afloat and receiving-ships	111
Total	203

Mortuary record of the Navy for the year 1889.

Causes of death.	Number of deaths.		
	Hospitals.	Yards and stations.	Vessels.
Adynamia	3	1	....
Alcoholismus	1	....	1
Aneurysma	2	....	....
Angina pectoris	....	1	....
Albuminuria	1	....	....
Asphyxia	....	1	....
Apoplexia	....	....	2
Bronchitis, acuta	1	....	2
Bronchitis, chronica	3	....	....
Congestio pulmonum	1	....	....
Constipatio	1	....	....
Cystitis	....	1	....
Carcinoma	4	....	....
Congestio cerebri	....	....	1
Chloral poisoning	....	....	1
Concussio	....	....	1
Dementia	2	....	....
Dysentery, acuta	....	....	2
Diarrhœa, acuta	....	....	1
Erysipelas	2	....	....
Encephalitis	1	....	....
Epithelioma	1	1	....
Febris intermittens	1	....	....
Febris remittens	....	....	3
Febris enterica	....	1	5
Frigoris effectus	1	....	....
Fractura	2	....	3
Febris contus simplex	....	....	1
Febris flava	....	....	3
Gangræna	....	....	1
Hæmoptysis	1	1	1
Hepatitis, acuta	....	1	....
Kaké (beri-beri)	....	....	1
Luxatio	....	....	1
Meningitis	1	....	1
Morbi val. cordis	7	2	5
Melancholia	....	....	1
Neuritis	....	1	....
Nephritis	3	....	1
Paralysis	2	2	....
Phthisis pneumonica, acuta	2	....	....
Phthisis pneumonica, chronica	9	....	2
Pleuritis	3	1	....
Pneumonia	10	2	4
Peritonitis	1	....	1
Rheumatismus	1	....	....
Septicæmia	....	1	....
Submersio	....	2	60
Suicidium	1	1	1
Syphilis consectiva	....	....	1
Tetanus	....	1	....
Vulnus incisum	1	....	1
Vulnus sclopetarium	1	1	3
Total	70	22	111

Ratio per thousand of deaths in the Navy for the year 1889, 18.09.

CONTRACTS.

Proposals for supplies to the Naval Laboratory, Brooklyn, N. Y., ***August*** **14, 1889.**

Bidders.	Class I, surgical instruments.	Class II, dispensary furniture.
W. H. Schieffelin & Co	$302.34	$1,526.61
Hazard, Hazard & Co	388.50	....
Rowland A. Robbins	302.08	1,488.90
George W. Marsh	325.15	....
McKesson & Robbins *	319.23	1,637.17

* Bid was informal.

Contracts for Classes I and II awarded to Rowland A. Robbins.

Proposals for building addition to stable at Naval Laboratory, Brooklyn, N. Y., ***August*** 14, 1889.

Bidders.	Amount.
Patrick Murphy	$750
Jacob Bisson	940
James Dillon	985

Contract awarded to Patrick Murphy.

Proposals for constructing sick quarters at navy-yard, Portsmouth, N. H., ***August*** **14,** 1889.

Bidders.	Amount.
Oliver L. Giddings	$35,000
Francis H. Smith	49,700

The bids being in excess of the appropriation were rejected.

Proposals for repairs to naval hospital and director's residence, Brooklyn, N. Y., August 27, 1889.

Bidders.	Amount.
James F. Conley	$2,600
Richard H. Rowe	3,383
Jeanson Brothers	2,845

Contract awarded to James F. Conley.

Proposals for supplies to Naval Laboratory, Brooklyn, N. Y., September 26, 1889.

Bidders.	Class I, hardware.	Class II, paints, oils, etc.	Class III, lumber.
A. F. Brombacher & Co	$614.99	....	....
Edward J. Hartman	686.84	....	....
Joseph W. Duryea	....	....	$367.13
Lewis H. Ross	....	....	328.82
J. B. Morrell & Co	612.66	$44.05	....
Francis T. Witte Hardware Company	1,208.65	....	....
Albert Flagler	606.68	....	....
Rowland A. Robbins	819.64	44.75	520.18

Class I awarded to Albert Flagler; Class II awarded to J. B. Morrell & Co.; Class III awarded to Lewis H. Ross.

Proposals for bottles for Naval Laboratory, Brooklyn, N. Y., December 21, 1889.

Bidders.	Amount.
Hagerty Bros. & Co	$1,108.62
E. B. Benjamin Manufacturing Company	991.50
Rowland A. Robbins	1,069.75
Charles H. Pleasants	1,212.45
Henry Allen	867.00

Contract awarded to Henry Allen.

Proposals for surgical instruments and appliances for Naval Laboratory, Brooklyn, N. Y., February 21, 1890.

Bidders.	Class I, surgical instruments.	Class II, surgical appliances.
McKesson & Robbins*	$1,635.70	$1,552.53
Richard King & Co*	1,509.80	....
Rowland A. Robbins	1,597.81	1,715.59
T. Alfred Reichardt & Co	1,651.00	....

* Bids informal.

Contracts for Classes I and II awarded to Rowland A. Robbins.

Proposals for repairs and addition to steam heating apparatus at Naval Hospital, Brooklyn, N. Y., May 1, 1890.

Bidders.	For the whole work.	Not including director's residence.
James Curran	$9,325	$8,305
Samuel J. Pope & Co	9,739	8,299
Philip Dorup & Co	8,728	....
Enoch Rutzler	10,192	8,961
Q. N. Evans Construction Company	6,347	5,185
George P. Jacobs & Co	9,135	8,185
Blake & Williams	10,658	9,058

Contract awarded Q. N. Evans Construction Company.

Proposals for annual supplies to Naval Hospital, Portsmouth, N. H., May 26, 1890.

Bidders.	Class I.	Class II.	Class III.	Class V.	Class VI.
Clarence M. Prince	$406.00	$568.10	$224.00	$100.00	$202.50
D. C. Norton & Co	483.70	549.03	247.00	105.00	180.00
Herman R. Paul	450.50	....	260.00	99.00	....
James E. Chase	....	543.12	246.00	....	180.00

Classes I and III awarded to Clarence M. Prince; Class II awarded to James E. Chase; Class V awarded to Herman R. Paul; Class VI awarded to D. C. Norton & Co., by lot.

Proposals for annual supplies to Naval Hospital, Chelsea, Mass., May 26, 1890.

Bidders.	Class I.	Class II.	Class III.	Class IV.	Class V.	Class VI.	Class VII.
C. A. Simonds	$1,644.50	....	$808.00	$980.00	$540.00	$640.00	....
M. J. Doran & Co	2,362.20	$2,393.84	938.00	....	660.00	620.00	....
Boston Ice Company	....	....	....	700.00	....	....	....
Horace P. Stevens	1,445.65	1,810.35	744.00	700.00	540.00	640.00	22.50
A. J. Bacon & Co	1,715.40	1,885.35	790.00	....	540.00	640.00	....

Classes I, II, III, and VII awarded to Horace P. Stevens; Class IV awarded to Boston Ice Company by lot; Class V awarded to A. J. Bacon & Co. by lot; Class VI awarded to M. J. Dorran & Co.

Proposals for annual supplies to naval hospital, Brooklyn, N. Y., May 26, 1890.

Bidders.	Class I.	Class II.	Class III.	Class IV.	Class V.	Class VI.	Class VII.	Class VII. Naval laboratory.
Patrick Morrison	$4,145.00	....	....	....	....	....	....	....
Andrew Koch	....	$3,294.29	$1,872.00	....	$2,400.00	....	$372.05	$447.20
A. T. Fitch	....	....	....	$2,500.00	....	....	....	....
W. H. Belford	4,959.10	3,402.16	1,868.00	1,800.00	2,600.00	$1,197.00	384.00	440.25
John Hanley	4,971.30	....	....	....	....	....	....	....
Peter H. Miller	....	....	....	....	....	1,200.00	....	....
William Wright	....	....	2,040.00	....	2,400.00	....	....	....

Class I awarded to Patrick Morrison. Classes II and VII awarded to Andrew Koch. Classes III, IV, VI, and VII for laboratory awarded to W. H. Belford. Class V awarded to William Wright, by lot.

Proposals for annual supplies to naval hospital, Philadelphia, Pa., May 26, 1890.

Bidders.	Class I.	Class II.	Class III.	Class IV.	Class V.	Class VI.
John T. Strickland	$2,697.00	....	....	$500.00	$660.00	....
Robert McKeown	....	$1,359.59	$801.20	....	720.00	$400.00
Samuel Sproul	....	1,317.51	....	....	....	....

Classes I, IV, and V awarded to John T. Strickland. Class II awarded to Samuel Sproul. Classes III and VI awarded to Robert McKeown.

Proposals for annual supplies to naval hospital Washington, D. C., May 26, 1890.

Bidders.	Class I.	Class II.	Class III.	Class IV.	Class V.	Class VI.	Class VII.
J. B. Bryan	....	$592.08	$258.20	$102.00	....	$212.50	....
F. P. Seibert	$725.10	....	....	....	....	....	....
C. C. Carroll	648.25	....	....	....	....	....	....
Browning & Middleton	....	659.03	255.90	120.00	$180.00	212.50	....
P. B. Otterback	705.95	611.99	292.00	114.00	150.00	212.50	....

Class I awarded to C. C. Carroll. Classes II and IV awarded to J. B. Bryan. Class III awarded to Browning & Middleton. Classes V and VI awarded to P. B. Otterback, Class VI by lot.

Proposals for annual supplies to naval hospital, Norfolk, Va., May 26, 1890.

Bidders.	Class I.	Class II.	Class III.	Class IV.	Class V.	Class VI.	Class VII.
C. R. Robertson	$1,687.80				$480.00		
J. G. Codd & Bro	1,585.90		$1,475.00		600.00		
Kate C. Brady					440.00		
L. C. Brinson	2,344.00	$2,031.50	1,290.00	$1,400.00		$562.50	$219.45
J. H. Bigbie & Co			1,207.50				
J. T. Parker & Bro		1,955.46	1,285.00		800.00	598.50	230.15
W. G. Maupin				875.00			
V. G. Naw						525.00	
Taylor & Loyall			1,557.50				
C. R. Nash				890.00			
Frank A. Mathews						577.50	
R. T. Mules						581.25	
O. L. Williams			1,230.00				208.98
E. L. Sash			1,257.50				

Class I awarded to J. G. Codd & Bro. Class II awarded to J. T. Parker & Bro. Class III awarded to J. H. Bigbie & Co. Class IV awarded to W. G. Maupin. Class V awarded to Kate C. Brady. Class VI awarded to V. G. Naw. Class VII awarded to O. L. Williams.

Proposals for annual supplies to naval hospital, Pensacola, Fla., May 26, 1890.

Bidders.	Class I.	Class II.	Class III.	Class IV.	Class V.	Class VI.	Class VII.
M. Mooney	$140.70	$403.32	$56.80	$300.00	$24.00	$30.00	$169.75
F. Bauer	140.50	475.90	54.30		20.00	25.00	131.30
B. A. Philibert	119.75	433.08	48.50	250.00	30.00	25.00	132.00
Benj. Dolphin	126.75	422.84	56.50	200.00	24.00	25.00	115.95

Classes I and III awarded to B. A. Philibert. Class II awarded to M. Mooney. Class IV awarded to Benj. Dolphin. Classes V, VI, and VII, awarded to F. Bauer. Class 6 by lot.

Proposals for annual supplies to naval hospital, Mare Island, Cal., May 25, 1890.

Bidders.	Class I.	Class II.	Class III.	Class IV.	Class V.	Class VI.	Class VII.	Class VII.
James McCudden	$1,607.75						$985.65	$256.00
James Smith						$300.00		
E. M. Wilson	2,982.80	$2,495.93	$577.90	$500.00	$10.00	400.00	1,632.57	300.00
James Brownlie		1,905.15	771.90		10.00		872.85	220.00
D. W. Harrier & Son	1,690.50	2,184.93	813.90	175.00	8.00	350.00	755.60	195.00
Henry Connolly				300.00				

Class I awarded to James McCudden. Class II awarded to James Brownlie. Class III awarded to E. M. Wilson. Classes IV, V, and VII, awarded to D. W. Harrier & Son. Class VI awarded to James Smith.

REPORT

OF

COMMANDANT OF UNITED STATES MARINE CORPS.

HEADQUARTERS U. S. MARINE CORPS,
Washington, D. C., October 1, 1890.

SIR: In obedience to your order of September 2, 1890, I have the honor to submit the annual report of the conditions and wants of the U. S. Marine Corps.

On October 1, 1890, there were 1,950 men in the corps, 918 of whom were on board ships in commission, and 1,032 at the several shore stations, which include the sick and prisoners. During the past year there have been 948 enlistments, 85 re-enlistments, 19 re-enlistments from the Army, 16 deaths, 387 discharges, 520 desertions, and 3 enlisted men retired.

Owing to sickness the colonel commandant has been placed on waiting orders until his retirement January 29, 1891. One lieutenant-colonel and one captain have been retired for disability, one first lieutenant has resigned, and two first lieutenants have resigned to take effect December 22, 1890, and June 30, 1891. One major on the retired list and three first lieutenants on the active list have died. Five second lieutenants have been appointed from the graduates of the Naval Academy, and are now being instructed in their duties at the Marine Barracks, Brooklyn, N. Y.

The usual inspections by the adjutant and inspector of the different posts during the year show them to be in a satisfactory condition.

I would earnestly suggest the propriety of obtaining from Congress an appropriation for 200 or 300 more privates, as the vessels now built and being built are much larger than the old ones and consequently require more marines. I would also recommend that the number of second lieutenants be increased to twenty, the number now allowed by law being twelve, which is insufficient.

The number of men at the different shore stations is inadequate to perform the duties properly and to protect the Government property from fire and theft, and no doubt many of the desertions are caused by their being overworked in the performance of this duty.

The act of June 16, 1890, which provides for the retention of $4 per month from the pay of all enlisted men during the first year of their enlistment, as well as the order of the Department directing the change from the Army to the Navy ration, will, in my opinion, prevent many desertions.

I have been informed by the quartermaster of the corps that all the public buildings under his charge at the several navy-yards are in better condition than ever before. The barracks at the navy-yard, Norfolk, Va., has progressed so far as to justify the belief that it will be ready for occupation by December 1 next. The necessity for erecting officers' quarters at this navy-yard will be apparent when it is considered that at the present time the marine officers attached to that command live quite a distance from the troops at an annual expense to the Government of over $2,000, a condition of affairs which should not exist.

The Marine Barracks at Mare Island, Cal., which was erected in 1864, requires considerable repairs, and $3,000 has been included in the estimates for the coming fiscal year to be used for that purpose.

An appropriation has been made for the erection of a marine barracks, at Sitka, Alaska. At present the marines are mustered as attached to the U. S. S. *Pinta*, though in reality they are quartered on shore in what is known as the naval guard-house, and performing regular post and garrison duty. A portion of land has been set apart by a board appointed by the Treasury Department to be used as a site for a marine barracks, and plans upon which to erect the same have been prepared by Capt. F. H. Harrington, commanding the marines at the above-named place, and it now remains for the Navy Department to issue the necessary instructions for the transfer of this parcel of land to the Marine Corps, when steps will be taken to commence the erection of the barracks.

I earnestly call the attention of the Department to the necessity for the erection at these headquarters of a suitable fire-proof building for use as offices of the commandant and staff, the one now in use being a small frame structure without vaults or other means of protection against fire. There are many valuable papers contained therein, the destruction of which would greatly embarrass the Government in the settlement of the accounts of officers and enlisted men, as well as obtaining evidence of services necessary in pension cases.

A copy of the usual estimates for the support of the corps for the coming fiscal year was forwarded to the Department September 25, and the duplicate is herewith inclosed.

Very respectfully, your obedient servant,

C. D. HEBB,
Colonel, U. S. M. C., Commanding.

Hon. B. F. TRACY,
Secretary of the Navy.
Washington, D. C.

HEADQUARTERS U. S. MARINE CORPS,
Washington, D. C., September 24, 1890.

SIR: I have the honor to inclose herewith for your approval the usual estimates for the support of the U. S. Marine Corps for the fiscal year ending June 30, 1892.

The accompanying letters will explain the necessity of the paymaster's and quartermaster's estimates. I have had included in those of the paymaster an estimate for another clerk in the office of the colonel commandant, as I consider it necessary, owing to the increase of business in the office.

I have also included an increase of pay for the chief clerks of the colonel commandant's, adjutant and inspector's and quartermaster's offices, to correspond with that allowed the chief clerk of the paymaster (which was recommended by the colonel commandant last year), and for the clerk of the assistant quartermaster in Philadelphia, to restore it to the amount he received while on duty in San Francisco.

Very respectfully, your obedient servant,

C. D. HEBB,
Colonel, U. S. Marine Corps, Commanding.

HON. B. F. TRACY,
Secretary of the Navy.

HEADQUARTERS U. S. MARINE CORPS,
PAYMASTER'S OFFICE,
Washington, D. C., September 24, 1890.

SIR: I respectfully submit herewith estimates for the pay of officers, non-commissioned officers, musicians and privates, and civil force of the U. S. Marine Corps for the fiscal year ending June 30, 1892.

These estimates show an increase of $10,232.74 over the estimates for the present fiscal year, viz:

Pay of officers on the active list	$830.00
Pay of officers on the retired list	5,857.50
Pay of retired enlisted men	2,145.24
Pay of civil force	1,400.00
Total increase	10,232.74

Very respectfully,

G. C. GOODLOE,
Major and Paymaster, U. S. Marine Corps.

The COLONEL COMMANDANT.

HEADQUARTERS U. S. MARINE CORPS,
QUARTERMASTER'S OFFICE,
Washington, D. C., September 23, 1890.

SIR: In submitting the annual estimates for the support of the quartermaster's department, U. S. Marine Corps, fiscal year 1891-'92, I respectfully call your attention to the following changes in the amounts estimated for, as against the amounts appropriated for the same objects, present fiscal year (1890-'91), stating the reasons that, in my judgment, make these changes necessary and desirable:

Provisions, increased	$28,586.25
Fuel, increased	3,671.00
Military stores, increased	5,000.00
Transportation and recruiting, increased	2,500.00
Repair of barracks, increased	49,500.00
Forage, increased	500.00
Contingencies, increased	3,000.00

PROVISIONS.

By direction of the honorable Secretary of the Navy, estimates are made with a view to procure and issue, in future, to the enlisted men of the Marine Corps serving on shore the navy instead of the army ration heretofore issued to them, this action being called for in order to comply with section 1615, Revised Statutes, which reads: "The non-commissioned officers, privates, and musicians of the Marine Corps, each, shall be entitled to receive one navy ration daily."

The ration is estimated for at 23¼ cents each, its average cost as issued to the seamen and other persons serving aboard the receiving ships at the various navy-yards.

FUEL.

The estimate for fuel is based upon the price at which it is obtained (under contracts) present fiscal year; but Congress having failed to appropriate the full amount estimated for that year, a defficiency will result, and hence the increased amount in the estimate for fuel.

MILITARY STORES.

The item of $5,000 for the purchase of one "Gatling" and one "Hotchkiss" gun is embraced under the above head to enable the Corps to have these guns at the Marine Barracks, Washington, D, C., for the purpose of instructing the enlisted men in their proper management and use preparatory to their duties aboard ships of war.

TRANSPORTATION AND RECRUITING.

It having been found necessary to open additional recruiting rendezvous, in order to keep the Corps up to its limit, and the fact that the guard at Sitka, Alaska, has to be changed and augmented, and that several vacancies existing in the guards of vessels of war on foreign stations have to be filled, convince me that the sum of $15,000 will be required under the above head.

REPAIR OF BARRACKS.

The item in the estimates now submitted of $25,000 for the erection of a fire-proof building for use as offices of commandant, adjutant and inspector, paymaster, and quartermaster at the headquarters of the Corps (Washington) is necessary, in view of the fact that the buildings now occupied for the purposes named are small frame structures, exposed to danger from fire liable to originate at any moment in frame tenement houses in the immediate vicinity. There are no vaults or other means in the offices for the protection of the archives against loss either by fire or burglars; and when it is considered that all the records of the Corps from 1787 to the present time are on file in the offices now occupied, embracing valuable and important papers required as evidence of service of enlisted men, upon which must be based all information relative to claims for pensions, bounties, etc., as well as all vouchers upon which moneys heretofore appropriated by Congress for the support of the Corps have been expended, it will at once be seen that the destruction of the present office buildings, with their contents, by fire would be a calamity; hence the absolute necessity for the appropriation in question. In connection with this subject I may add that a recommendation for the erection of a suitable fire-proof building for the purpose heretofore indicated was made by the honorable Secretary of the Navy to Congress during its present session.

The Marine Barracks at Mare Island, California, erected in 1864, has during the long period of its existence received but scant repairs, and has at last reached that condition which makes somewhat extensive alterations and repairs an absolute necessity. An item of $3,000 is included to meet this object.

FORAGE.

The estimate under this head is based upon the prices at which forage is obtained under contract present fiscal year; but the fact that Congress failed to appropriate the amount estimated for, will create a deficiency; hence the increase in the estimate for forage.

CONTINGENCIES.

It having been decided to introduce the electric light into the navy-yard, Mare Island, California, and to cut off the supply of gas, which is now furnished by the gas-works at Vallejo, we are compelled to make connections with the electric plant and run the necessary wires, etc., into the public buildings of the Marine Corps at that station. From estimates received I find that this will cost about $3,000.

Very respectfully, your obedient servant,

H. B. LOWRY,
Major and Quartermaster, U. S. Marine Corps.

The COLONEL COMMANDANT.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, *by the paymaster of the U. S. Marine Corps.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Amount appropriated for the current fiscal year ending June 30, 1891.
PAY MARINE CORPS.		
Pay of officers on the active list:		
One colonel-commandant, 1 colonel, 2 lieutenant colonels, 1 adjutant and inspector, 1 paymaster, 1 quartermaster, 4 majors, 2 assistant quartermasters, 1 judge-advocate-general U. S. Navy, 19 captains, 30 first lieutenants, and 12 second lieutenants	$181,310.00	
Pay of officers on the retired list:		
Three colonels, 2 lieutenant-colonels, 1 quartermaster, 1 major, 1 assistant quartermaster, 6 captains, 3 first lieutenants, and 3 second lieutenants	43,612.50	
Pay of non-commissioned officers, musicians, and privates:		
One sergeant-major, 1 quartermaster-sergeant, 1 leader of the band, 1 drum-major, 50 first sergeants, 140 sergeants, 180 corporals, 30 musicians, 96 drummers and fifers, and 1,600 privates	404,700.00	
Pay of retired enlisted men:		
One sergeant-major, 1 drum major, 4 first sergeants, 5 sergeants, 1 first-class musician, 2 drummers, 1 fifer, and 18 privates	10,888.68	
Undrawn clothing:		
Payment of discharged soldiers for clothing undrawn	35,000.00	
Mileage (act June 30, 1834, 4 Stat., 713, sec. 415):		
Mileage of officers traveling without troops (acts Mar. 2, 1847, Aug. 5, 1854, 9, Stat., 155, sec. 3, 10 Stat. 586, sec. 1)	9,000.00	
ommutation of quarters (act Feb. 21, 1857, 11 Stat., 163 sec. 1):		
Commutation of quarters to officers on duty without troops where there are no public quarters (acts July 17, 1862, June 30, 1864, 12 Stat., 594, sec. 2, 13 Stat., 144, sec. 1	4,000.00	
PAY OF CIVIL FORCE (act Mar. 3, 1865, 13 Stat., 487, Sec. 1.)		
In the office of the colonel-commandant (act July 28, 1866, 14 Stat., 334, sec. 1.):		
One chief clerk, $1,540.80 (increase $59.20 submitted) (act Mar. 2, 1867, 14 Stat. 422, sec. 1)	1,600.00	
One clerk (additional submitted) (act Mar. 2, 1867, 14 Stat., 517, sec. 7)	1,400.00	
One messenger, at $80.94 per month (act July 15, 1870, 16 Stat., 330, sec 3)	971.28	
In the office of the adjutant and inspector (act Jan. 30, 1885, 23 Stat., 293, 294, sec. 1):		
One chief clerk, $1,540.80 (increase $59.20 submitted) (act Feb. 14, 1885, 23 Stat., 305, sec. 1)	1,600.00	
One clerk (Navy regulations)	1,496.52	
In the office of the paymaster (act July 18, 1816):		
One chief clerk (act Mar. 2, 1889, 25 Stat., 821, sec. 1)	1,600.00	
One clerk	1,496.52	
One clerk	1,257.12	
In the office of the quartermaster:		
One chief clerk, $1,540.80 (increase $59.20 submitted)	1,600.00	
One clerk	1,496.52	
One clerk	1,257.12	
In the office of the assistant quartermaster, Washington:		
One clerk	1,400.00	
In the office of the assistant quartermaster, Philadelphia, Pa.:		
One clerk, $1,257.12 (increase $142.88 submitted)	1,400.00	
One messenger, at $1.75 per diem	638.75	
Total pay of civil force	19,218.83	
Grand total	707,725.01	$687,471.79

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, by the quartermaster's department, U. S. Marine Corps.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
PROVISIONS.			
For 1,100 non-commissioned officers, musicians, and privates, and for commutation of rations for 11 enlisted men detailed as clerks and messengers, also for payment of board and lodging of recruiting parties. (See note No. 1)	$95,424.33		
For amount required to be transferred to paymaster, U. S. Marine Corps, on account of rations to retired men, $82.13 per annum. (See note No. 2.)	2,299.64		
		$97,723.97	$90,137.72
NOTE No. 1.—The commutation in lieu of rations in kind, at the rate of $1.75, to these enlisted men; also commutation of quarters, at $21 and $10 per month, authorized by orders of the Navy Department, dated June 20, 1880, and July 30, 1885.			
NOTE No. 2.—There are 28 retired men at this date.			
CLOTHING.			
For 2,100 non-commissioned officers, musicians, and privates		75,000.00	75,000.00
FUEL.			
For heating barracks and quarters, for ranges and stoves for cooking purposes, fuel for enlisted men, and sales to officers		23,671.00	20,000.00
MILITARY STORES.			
For pay of chief armorer, at $3 per day, $939; three mechanics, at $2.50 per day each; $2,347.50 in all	3,286.50		
For purchase of military equipments, such as cartridge-boxes, bayonet scabbards, haversacks, blanket-bags, knapsacks, canteens, musket-slings, swords, drums, trumpets, flags, waist-belts, waist-plates, cartridge-belts, and spare parts for repairing muskets, etc	7,213.50		
For purchase of ammunition	1,000.00		
For purchase and repair of instruments for band; purchase of music and musical accessories	500.00		
For purchase of one Gatling revolving gun complete For purchase of one Hotchkiss revolving gun complete	5,000.00		
		17,000.00	12,000.00
TRANSPORTATION AND RECRUITING.			
For transportation of troops and for the recruiting service		15,000.00	12,500.00
REPAIR OF BARRACKS.			
At Portsmouth, N. H.; Boston, Mass.; Brooklyn, N. Y.; League Island, Pa.; Annapolis, Md.; Headquarters and navy-yard, Washington, D. C.; Norfolk, Va.; Pensacola, Fla; and Mare Island, Cal.; and per diem to enlisted men employed under the direction of the quartermaster's department on the repair of barracks and other public buildings	10,000.00		
For alterations and repair of marine barracks at Mare Island, Cal	3,000.00		
For erection of offices at headquarters	25,000.00		
For rent of buildings used for the manufacture of clothing, storing supplies, and office of assistant quartermaster, Philadelphia	1,300.00		
		39,300.00	34,800.00
FORAGE.			
For forage in kind for 5 horses of the quartermaster's Department and the authorized number of officers' horses		4,000.00	3,500.00
HIRE OF QUARTERS.			
For hire of quarters for officers serving with troops where there are no public quarters belonging to the Government, and where there are not sufficient quarters possessed by the United States to accommodate them	4,500.00		

Estimates of appropriations required for the service of the fiscal year ending June 30, 1892, *by the quartermaster's department, etc.*—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1891.
HIRE OF QUARTERS—continued.			
For hire of quarters for 7 enlisted men employed as clerks and messengers in commandant's, adjutant's, and inspector's, quartermaster's, and paymaster's offices, Washington, D. C., and assistant quartermaster's, Philadelphia, Pa., at $21 per month each	$1,764.00	....	....
For hire of quarters for 3 enlisted men employed as above at $10 each per month	360.00		
		$6,624.00	$6,624.00
CONTINGENCIES.			
For freight, ferriage, toll, cartage, funeral expenses of marines, stationery, telegraphing, rent of telephone, purchase and repair of type-writers, apprehension of stragglers and deserters, per diem to enlisted men employed on constant labor for a period of not less than ten days, repair of gas and water fixtures, office and barrack furniture, mess utensils for enlisted men, such as bowls, plates, knives, forks, spoons, packing-boxes, wrapping paper, oil-cloth, crash, rope, twine, camphor and carbolized paper, carpenter's tools, tools for police purposes, iron safes, purchase and repair of public wagons, purchase and repair of harness, purchase of public horses, purchase of medicine for public horses and services of veterinary surgeons, purchase and repair of hose, repair of fire-extinguishers, purchase of fire hand grenades, purchase and repair of carts and wheelbarrows, purchase and repair of cooking-stoves and ranges, stoves and furnaces, where there are no grates, purchase of ice, towels, and soap for offices, postage-stamps for foreign postage, purchase of newspapers and periodicals, improving parade-grounds, repair of pumps and wharves, laying drain and water pipes, introducing gas and for gas and oil for marine barracks maintained at the various navy-yards and stations, water at the marine barracks, Boston, Mass., Brooklyn, N. Y., Annapolis, Md., and Mare Island, Cal.; also straw for bedding and purchase of mattresses for enlisted men at the various posts, furniture for Government houses and repair of same, and for all emergencies and extraordinary expenses arising at home and abroad, but impossible to anticipate or classify; in all	27,500.00	....	....
For introducing electric lights at marine barracks, Mare Island, Cal	3,000.00		
		30,500.00	27,500.00
		308,818.97	251,061.72

HEADQUARTERS U. S. MARINE CORPS,
QUARTERMASTER'S OFFICE,
Washington, D. C., October 25, 1890.

SIR: I herewith inclose abstracts in duplicate of proposals for furnishing rations, fuel, and supplies to the U. S. Marine Corps during the fiscal year ending June 30, 1891.

Very respectfully, your obedient servant,

H. B. LOWRY,
Major and Quartermaster, U. S. Marine Corps.

Hon. B. F. TRACY,
Secretary of the Navy.

Schedule of proposals for supplies for the Marine Corps, under advertisement inviting proposals, dated April 14, 1890.

Names of bidders.	Class.	Amount.	Names of bidders.	Class.	Amount.
Wendel, Fay & Co	1	$21, 200. 00	Liberty Woolen Mills	1	*16, 607. 25
Do	1	3, 320. 00	Patrick Cavanaugh	4	*338. 00
William McKnight	1	*9, 320. 00	Francis H. Smith	1	12, 400. 00
Jesse St. John	1	645. 00	B. Y. Pippey & Co	1	*40, 727. 00
Charles F. Bush	1	*6, 530. 00	Tissot & Schultz	1, 2, 3	*7, 979. 61
Marc M. Michael	1, 2, 3, 4	*5, 630. 99	Charles F. Lehman	1	*802. 00
Lyon Bros	1	*2, 200. 00	John Sullivan	4	198. 10
Horstmann Bros. & Co	1, 2, 3, 4	*12, 444. 70	Henry C. Harper	1, 3	*8, 805. 51
T. A. Ashburner	1, 3	*22, 535. 79	Paul J. Field	4	*246. 52
Melville Lindsay	1	714. 00	William F. Bernstein	1, 2, 3	*7, 866. 71
B. Rich & Son	1, 2, 3	3, 853. 50	George F. Roedel	1	10, 508. 00
H. T. Kent	1	*18, 764. 00	Joseph Wechsler	3	*1, 969. 20
William P. West	3	*197. 40	Rowland A. Robbins	1, 3, 4	*24, 010. 58
Charles A. Muddimann	4	25. 00	W. A. Squire	1, 3	2, 255. 00
Anton Wurlitzer	2	*447. 69	R. Levick's Sons & Co	1	*636. 00
The Medicott Company	1	4, 420. 00			

* Accepted for part of class.

Schedule of proposals received for supply of rations for the Marine Corps, for the year 1891, *under advertisement from the quartermaster's office, dated April* 14, 1890.

Names of contractors.	At Portsmouth, N. H.	At Charlestown, Mass.	At Brooklyn, N. Y.	At Philadelphia, Pa.	At Washington, D. C.	At Gosport, Va.	At Annapolis, Md.	At Mare Island, Cal.
C. L. Hathaway	....	....	....	....	....	....	....	$18. 99
C. L. Hewlett	....	....	*$13. 40	....	....	....	....	....
C. A. Simmonds	$20. 00	$18. 97	17. 00	$19. 20	$18. 00	$18. 00	$22. 00	25. 00
J. Kealy	....	....	....	....	....	....	16. 44	....
Max Sadler & Co	....	....	....	....	....	....	....	15. 75
A. J. Bacon & Co	....	13. 85	....	....	....	....	....	....
J. C. Ergood & Co	18. 73	17. 42	16. 48	18. 95	14. 65	....	16. 81	....
T. J. Barlow	....	....	....	....	....	*13. 80	....	....
M. J. Doran & Co	*17. 99	*13. 45	....	....	....	....	....	....
J. L. Stutz	....	....	....	....	....	....	....	16. 99
J. McCudden	....	....	....	....	....	....	....	17. 50
E. M. Wilson	....	....	....	....	....	....	....	15. 00
J. Mullett	....	13. 94	....	....	....	....	....	....
J. T. McGill	....	....	....	....	....	....	....	17. 49
J. Brownlie	....	....	....	....	....	....	....	*14. 25
J. T. Barker & Bro	....	....	....	....	....	13. 87	....	....
S. J. Gerrish	18. 48	....	....	....	....	....	....	....
W. H. Belford	....	....	14. 87	....	....	....	....	....
J, B. Bryan	....	....	....	....	17. 08	....	....	....
J. L. Barbour & Co	....	....	14. 75	*18. 50	*12. 00	14. 80	*16. 00	....
F. Hume	....	....	....	....	13. 23	....	....	....

* Accepted.

***Schedule of proposals received for supply of wood and coal to the Marine Corps, under advertisement from quartermaster's office, dated April* 14, 1890.**

Names of bidders.	Where to be delivered.	Wood, per cord. Oak in stick.	Wood, per cord. Pine in stick.	Wood, per cord. Pine (kindling) sawed and split.	Coal, per ton. Red ash (egg).	Coal, per ton. Red ash (stove).	Coal, per ton. White ash (egg).	Coal, per ton. White ash (stove).	Coal, per ton. White ash (nut).	Coal, per ton. White ash (furnace).
Stephenson Bros...	Officers and officers' quarters, Washington and Georgetown, D. C., and within 1 mile of limits of said cities.	$5.50	$5.50	$6.50	$5.75	$5.90	$5.70	$5.90	$5.70	$5.70
G. L. Sheriff	....do	*5.47	4.68	6.97	5.65	5.80	5.50	5.65	......	5.50
J. Miller............	....do	6.00	5.00	6.50	5.50	6.00	5.50	5.50	......	5.25
J. Z. Williams......	....do	5.50	*3.93	*4.90	*5.50	*5.50	*5.00	*5.20	......	*5.00
Stephenson & Bros.	Marine Barracks, and navy-yard, Washington, D.C.	5.50	5.00	6.25	5.75	5.90	5.70	5.90	5.70	5.70
G. L. Sheriff	....do	4.97	3.97	......	......	......	*4.69	......	......	*4.69
J. Miller	....do	5.50	5.00	......	......	......	4.85	......	......	4.85
J. Z. Williams	....do	*4.50	*3.93	......	......	......	5.00	......	......	5.00
Jas. J. Convery	Offices and officers' quarters and rendezvous, Philadelphia, Pa.	7.44	......	......	......	4.90	4.90	......	......	......
Frank K. Ward.....	....do	7.00	7.00	11.00	......	5.25	5.25	......	......	......
Chas. L. Lowery....	....do	*6 75	*6.75	*9.75	......	*4.80	*4.80	......	......	......
John Keely..........	Marine Barracks, Annapolis, Md.	6.00	*3.74	*5.24	5.74	5.94	5.24	5.74	5.54	4.74
John Miller..........	....do	7.00	5.50	7.00	......	6.50	5.50	6.00	......	......
J. S. M. Basil	... do	*4.73	3.84	5.87	......	*5.94	*4.94	*5.09	......	......
W. G. Parker.......	Officers' quarters, Norfolk, Va.	*5.00	*5.00	......	......	......	6.00	6.25	......	......
S. P. Oast...........	... do	5.50	5.00	6.00	6.25	6.25	6.00	6.25	6.25	6.25
J. Miller	.. do	8.00	6.00	......	......	......	*5.90	*6.00	......	......
W. G. Parker.......	Marine Barracks, Norfolk, Va.	*4.50	*4.00	......	......	......	*5.75	*6.00	......	......
John Miller..........	....do	8.00	6.50	......	......	......	5.90	6.00	......	......
S. P. Oast...........	....do	5.00	4.50	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Jas. E. Chase.......	....do	8.50	6.00	......	......	......	......	......	......	......
W. H. Sise	Marine Barracks, Portsmouth, N. H.	8.50	6.25	7.25	......	......	7.36	7.71	......	7.36
E. C. Spinney.......	....do	7.50	5.50	*6.50	......	......	......	......	......	......
S. J. Gerrish	....do	*7.00	*5.00	7.00	......	......	......	......	......	......
C. E. Walker & Co.	....do	7.50	6.50	9.50	10.00	10.00	*6.75	7.75	7.75	*6.75
S. G. French	....do	9.44	9.44	10.24	......	......	6.94	......	......	6.94
Do	Marine Barracks, Charlestown, Mass.	*9.00	*9.00	*9.44	......	......	*7.14	*7.44	......	*7.14
Do...............	Marine Barracks, Brooklyn, N. Y.	*9.44	*9.44	*9.84	......	......	*5.44	......	......	*5.44
W. D. Bruns, jr....	....do	10.65	10.65	10.65	......	......	5.84	......	......	5.84
J. J. Convery.......	Marine Barracks, League Island, Pa.	13.00	12.00	......	......	......	7.84	......	......	......
S. G. French	....do	*9.44	*9.44	10.24	......	......	*7.24	......	......	......
Aden Bros. & Co...	Marine Barracks, Mare Island, Cal.	8.95	8.95	10.95	......	......	18.00	......	......	......
N. Claro.............	....do	*8.49	*8.49	*10.00	......	......	18.74	......	......	......
S. G. French	....do	......	......	......	......	......	18.44	......	......	......
Wm. Walker........	....do	......	......	......	......	......	19.25	......	......	......
J. McCudden........	....do	9.50	9.50	11.50	......	......	*17.25	......	......	......

*Accepted.

Detailed statement of the estimate for "Pay of the Navy" for the fiscal year ending June 30, 1892.

ACTIVE LIST.

Grade.	Sea duty.			Other duty.			Waiting orders.		
	No.	Pay per annum.	Total.	No.	Pay per annum.	Total.	No.	Pay per annum.	Total.
1 Admiral				1	$13,000	$13,000			
6 Rear admirals	2	$6,000	$12,000	4	5,000	20,000			
1 Commodore (chief of bureau)				1	5,000	5,000			
9 Commodores	3	5,000	15,000	5	4,000	20,000	1	$3,000	$3,000
2 Captains (chiefs of bureaus)				2	5,000	10,000			
43 Captains	9	4,500	40,500	30	3,500	105,000	4	2,800	11,200
1 Commander (chief of bureau)				1	5,000	5,000			
84 Commanders	17	3,500	59,500	45	3,000	135,000	22	2,300	50,600
61 Lieutenant-commanders (after 4 years)	25	3,000	75,000	30	2,600	78,000	6	2,200	13,200
13 Lieutenant-commanders (first 4 years)	6	2,800	16,800	5	2,400	12,000	2	2,000	4,000
211 Lieutenants (after 5 years)	108	2,600	280,800	83	2,200	182,600	20	1,800	36,000
39 Lieutenants (first 5 years)	20	2,400	48,000	16	2,000	32,000	3	1,600	4,800
34 Lieutenants, junior grade	18	2,000	36,000	14	1,700	23,800	2	1,400	2,800
42 Lieutenants, junior grade (first 5 years)	28	1,800	50,400	10	1,500	15,000	4	1,200	4,800
177 Ensigns (after 5 years)	127	1,400	177,800	45	1,200	54,000	5	1,000	5,000
Ensigns (first 5 years)									
68 Naval cadets (undergraduates)	68	950	64,600						
1 Medical director (chief of bureau)				1	5,000	5,000			
14 Medical directors (after 20 years from date of commission as surgeon)				14	4,000	56,000			
15 Medical inspectors (fleet-surgeons)	6	4,400	26,400	7	4,000	28,000	2	3,000	6,000
Surgeons (after 20 years)									
8 Surgeons (fourth 5 years)	2	3,700	7,400	6	3,600	21,600			
12 Surgeons (third 5 years)	2	3,500	7,000	8	3,200	25,600	2	2,600	5,200
17 Surgeons (second 5 years)	7	3,200	22,400	8	2,800	22.400	2	2,400	4,800
13 Surgeons (first 5 years)	5	2,800	14,000	6	2,400	14,400	2	2,000	4,000
39 Passed assistant surgeons (after 5 years from date of appointment)	25	2,200	55,000	11	2,000	22,000	3	1,700	5,100
15 Passed assistant surgeons (first 5 years)	8	2,000	16,000	5	1,800	9,000	2	1,500	3,000
29 Assistant surgeons (after 5 years)	20	1,900	38,000	8	1,600	12,800	1	1,200	1,200
2 Assistant surgeons (not in line of promotion)	1	1,900	1,900	1	1,600	1,600			
13 Pay directors (after 20 years from date of commission as paymaster)				9	4,000	36,000	4	3,000	12,000
1 Pay inspector (chief of bureau)				1	5,000	5,000			
1 Pay inspector (fleet-paymaster)	1	4,400	4,400						
11 Pay inspectors (after 20 years)	1	4,204	4,200	7	4,000	28,000	3	3,000	9,000
15 Paymasters (after 20 years)	7	4,200	29,400	8	4,000	32,000			
7 Paymasters (fourth 5 years)	2	3,700	7,400	5	3,600	18,000			
12 Paymasters (third 5 years)	7	3,500	24,500	1	3,200	3,200	4	2,600	10,400
4 Paymasters (second 5 years)	3	3,200	9,600	1	2,800	2,800			
3 Paymasters (first 5 years)	1	2,800	2,800	1	2,400	2,400	1	2,000	2,000
18 Passed assistant paymasters (after 5 years)	11	2,200	24,200	4	2,000	8,000	3	1,700	5,100
4 Passed assistant paymasters (first 5 years)	1	2,000	2,000	3	1,800	5,400			
11 Assistant paymasters (after 5 years)	9	1,900	17,100	1	1,600	1,600	1	1,200	1,200
1 Chief engineer (chief of bureau)				1	5,000	5,000			
5 Chief engineers (fleet-engineers)	5	4,400	22,000						
27 Chief engineers (after 20 years)	4	4,400	17,600	19	4,000	76.000	4	3,000	12,000
10 Chief engineers (fourth 5 years)	2	3,700	7,400	6	3,600	21,600	2	2,800	5,600
14 Chief engineers (third 5 years)	4	3,500	14,000	9	3,200	28,800	1	2,600	2,600
7 Chief engineers (second 5 years)	2	3,200	6,400	4	2,800	11,200	1	2,400	2,400
12 Chief engineers (first 5 years)	4	2,800	11,200	8	2,400	19,200			
32 Passed assistant engineers (fourth 5 years)	13	2,700	35,100	14	2,350	32,900	5	1,900	9,500
15 Passed assistant engineers (third 5 years)	5	2,450	12,250	8	2,250	18,000	2	1,900	3,800
12 Passed assistant engineers (second 5 years)	3	2,200	6,600	8	2,000	16,000	1	1,700	1,700
13 Passed assistant engineers (first 5 years)	6	2,000	12,000	6	1,800	10,800	1	1,500	1,500
61 Assistant engineers (after 5 years)	23	1,900	43,700	36	1,600	57,600	2	1,200	2,400
Assistant engineers (first 5 years)									
20 Chaplains (after 5 years)	10	2,800	28,000	4	2,300	9,200	6	1,900	11,400
4 Chaplains (first 5 years)	3	2,500	7,500				1	1,600	1,600

Detailed statement of the estimate for "Pay of the Navy," etc.—Continued.

ACTIVE LIST—Continued.

Grade.	Sea duty.			Other duty.			Waiting orders.		
	No.	Pay per annum.	Total.	No.	Pay per annum.	Total.	No.	Pay per annum.	Total.
6 Professors of mathematics (after 15 years)				6	$3,500	$21,000			
4 Professors of mathematics (third 5 years)				4	3,000	12,000			
1 Professor of mathematics (second 5 years				1	2,700	2,700			
1 One vacancy (first 5 years)				1	2,400	2,400			
1 Chief constructor (chief of bureau)				1	5,000	5,000			
5 Naval constructors (fourth 5 years)				5	4,000	20,000			
5 Naval constructors (first 5 years)				5	3,200	16,000			
11 Assistant naval constructors (after 8 years from date of commission)				11	2,600	28,600			
Assistant naval constructor (second 4 years)									
Assistant naval constructor (first 4 years)									
Assistant naval constructor									
3 Civil engineers (after 15 years)				3	3,500	10,500			
6 Civil engineers (third 5 years)				6	3,000	18,000			
Civil engineers (second 5 years)									
1 Civil engineer (first 5 years)				1	2,400	2,400			
35 Boatswains (after 12 years from date of appointment)	12	$1,800	$21,600	18	1,600	28,000	5	$1,200	$6,000
Boatswains (fourth 3 years)									
Boatswains (third 3 years)									
Boatswains (first 3 years)									
45 Carpenters (after 12 years)	17	1,800	30,600	24	1,600	38,400	4	1,200	4,800
Carpenters (fourth 3 years)									
Carpenters (third 3 years)									
Carpenters (second 3 years)									
26 Sailmakers (after 12 years)	13	1,800	23,400	9	1,600	14,400	4	1,200	4,800
Sailmakers (fourth 3 years)									
Sailmakers (third 3 years)									
35 Gunners (after 12 years)	13	1,800	23,400	15	1,600	24,000	7	1,200	8,400
Gunners (fourth 3 years)									
Gunners (third 3 years)									
Gunners (second 3 years)									
Gunners (first 3 years)									
29 Mates	13	900	11,700	15	700	10,500	1	500	500
1504 Total	702		1,524,550	656		1,632,200	146		283,400

Total pay for 1,504 officers on the active list	**$3,440,150**
Pay for 283 naval cadets (under instruction at Naval Academy), at $500 per annum	**141,500**
Aggregate	**3,581,650**

RETIRED LIST.

***Estimate of the amount required to pay retired officers of the United States Navy for the fiscal year ending June* 30, 1892.**

Grade.	No.	Pay per annum.	Total.	Grade.	No.	Pay per annum.	Total.
Rear-admiral	1	$6,000	$6,000	Pay director	1	$3,750	$3,750
Rear-admirals	39	4,500	175,500	Pay directors	7	3,300	22,100
Rear-admirals	1	3,750	3,750	Pay inspectors	3	3,300	9,900
Commodores	8	3,750	30,000	Paymaster	1	3,150	3,150
Commodores	2	2,625	5,250	Paymasters	2	2,625	5,250
Captains	5	3,375	16,875	Paymaster	1	2,400	2,400
Captains	2	2,625	5,250	Paymaster	1	1,400	1,400
Captain	1	2,250	2,250	Passed assistant paymaster	1	1,650	1,650
Captains	2	1,950	3,900	Passed assistant paymaster	1	1,500	1,500
Captain	1	900	900	Assistant paymaster	1	1,425	1,425
Commanders	7	2,625	18,375	Assistant paymaster	1	600	600
Commander	1	2,100	2,100	Chief engineer	1	3,750	3,750
Commander	1	1,750	1,750	Chief engineers	12	3,300	39,600
Commander	1	1,400	1,400	Chief engineers	3	2,625	7,875
Commander	1	1,300	1,300	Chief engineer	1	2,550	2,550
Commander	1	900	900	Chief engineer	1	2,400	2,400
Lieutenant-commanders	8	2,250	18,000	Passed assistant engineers	2	2,025	4,050
Lieutenant-commanders	8	2,100	16,800	Passed assistant engineers	3	1,838	5,514
Lieutenant-commander	1	1,950	1,950	Passed assistant engineers	15	1,650	24,750
Lieutenant-commander	1	1,500	1,500	Passed assistant engineer	1	1,500	1,500
Lieutenant-commander	1	1,350	1,350	Passed assistant engineers	3	1,275	3,825
Lieutenant-commanders	3	1,100	3,300	Passed assistant engineers	2	1,100	2,200
Lieutenant-commander	1	700	700	Passed assistant engineer	1	850	850
Lieutenants	22	1,950	42,900	Passed assistant engineer	1	400	400
Lieutenants	2	1,800	3,600	Assistant engineers	20	1,425	28,500
Lieutenants	2	1,200	2,400	Assistant engineers	2	1,557	2,114
Lieutenants	3	900	2,700	Assistant engineer	1	1,275	1,275
Lieutenants (junior grade)	6	1,500	9,000	Assistant engineer	1	950	950
Lieutenants (junior grade)	5	1,350	6,750	Assistant engineers	2	850	1,700
Lieutenants (junior grade)	3	900	2,700	Assistant engineer	1	600	600
Lieutenant (junior grade)	1	700	700	Assistant engineer	1	500	500
Ensigns	11	1,050	11,500	Chaplains	5	2,100	10,500
Ensign	1	900	900	Professors of mathematics	2	2,625	5,250
Ensigns	2	600	1,200	Naval constructor	1	3,750	3,750
Ensign	1	500	500	Naval constructors	1	3,375	3,375
Ensign	1	300	300	Naval constructor	2	3,150	6,300
Medical director	1	3,750	3,750	Naval constructor	1	1,950	1,950
Medical directors	14	3,300	46,200	Civil engineer	1	3,250	3,250
Medical directors	3	3,150	9,450	Boatswains	16	1,350	21,600
Medical inspectors	7	3,300	23,100	Boatswain	1	600	600
Surgeons	3	2,625	7,875	Boatswain	1	900	900
Surgeons	2	2,400	4,800	Gunners	21	1,350	28,350
Surgeon	1	2,100	2,100	Carpenters	10	1,350	13,500
Passed assistant surgeons	5	1,650	8,250	Sailmakers	11	1,350	14,850
Passed assistant surgeon	1	1,100	1,100	Sailmaker	1	500	500
Assistant surgeons	3	1,425	4,275				
Assistant surgeons	2	1,275	2,550	Total	368	....	818,103
Assistant surgeon	1	850	850				

SECRETARIES AND CLERKS.

Number of secretaries and clerks and their pay, allowed to commandants of yards and stations; to paymasters of yards, to general storekeepers, and on receiving ships and cruising vessels.

Number and designation.	Where employed.	Pay.
One secretary to Admiral		$2,500
One first clerk to commandant	Navy yard, Portsmouth, N. H	1,500
One second clerk to commandant	...do	1,200
One clerk to paymaster of yard	...do	1,400
One principal clerk to general storekeeper	...do	1,300
One first clerk to commandant	Navy yard, Boston, Mass	1,500
One clerk to paymaster of yard	...do	1,600
One principal clerk to general storekeeper	...do	1,600
One clerk to paymaster of receiving ship	...do	1,600
One first clerk to commandant	Navy yard, New York, N. Y	1,500
One second clerk to commandant	...do	1,200
One clerk to paymaster of yard	...do	1,600
One principal clerk to general storekeeper	...do	1,600
One clerk to paymaster of receiving ship	...do	1,600
One first clerk to commandant	Navy yard, League Island, Pa	1,500
One second clerk to commandant	...do	1,200
One clerk to paymaster of yard	...do	1,600
One principal clerk to general storekeeper	...do	1,600
One clerk to paymaster of receiving ship	...do	1,600
One first clerk to commandant	Navy yard, Norfolk, Va	1,500
One second clerk to commandant	...do	1,200
One clerk to paymaster of yard	...do	1,400
One principal clerk to general storekeeper	...do	1,300
One clerk to paymaster of receiving ship	...do	1,300
One clerk to paymaster of vessels on James River	...do	1,000
One first clerk to commandant	Navy yard, Washington, D. C	1,500
Two second clerks to commandant, at $1,200 each	...do	2,400
One clerk to paymaster of yard	...do	1,600
One principal clerk to general storekeeper	...do	1,600
One clerk to paymaster of receiving ship	...do	1,300
One second clerk to commandant	Navy yard, Pensacola, Fla	1,200
One clerk to paymaster of yard	...do	1,400
One first clerk to commandant	Navy-yard, Mare Island, Cal	1,800
One second clerk to commandant	...do	1,200
One clerk to paymaster of yard	...do	1,800
One principal clerk to general storekeeper	...do	1,300
One clerk to paymaster of receiving ship	...do	1,800
One clerk to commandant	Naval Station, New London, Conn	1,500
One clerk to paymaster of station	...do	1,300
One clerk to commandant	Training station, Newport, R. I	1,500
One clerk to paymaster of receiving ship	...do	1,300
One clerk to paymaster of station	Torpedo station, Newport, R. I	1,300
One clerk to superintendent	War College, Newport, R. I	1,500
One clerk to commandant	Naval Station, Key West, Fla	1,500
One clerk to paymaster of station	...do	1,200
One first clerk to commandant	Naval Academy, Annapolis, Md	1,500
One clerk to cadets' storekeeper	...do	1,500
One clerk to general storekeeper	...do	1,300
One clerk to commissary	...do	1,300
One clerk to paymaster of the Academy	...do	1,300
One clerk to paymaster of ships	...do	1,200
One clerk to commanding officer	Naval Asylum, Philadelphia, Pa	1,500
One clerk to paymaster	...do	1,300
One clerk to the general inspector, Pay Corps		1,300
Ten clerks to paymasters of flag-ships, at $1,100 each		11,100
Seven clerks to paymasters of second-rate ships, at $1,100 each		7,700
Twenty-one clerks to paymasters of third-rate, training, and store ships, at $1,000 each		21,000
Total		118,800

RECAPITULATION.

Total pay for 1,504 officers on the active list	$3,440,150
Total pay for 283 naval cadets, under instruction	141,500
Total pay for 368 officers on the retired list	818,800
Total pay for 1 secretary and 92 clerks	118,800
Total	4,519,250

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